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### Improved Musquito Canopy.

The melancholy days draw near when the musquito comes with his bill and demands what little blood the heat and cares of business have left in our enervated frames. In vain the tormented sleeper strives to elude the persecutions of his physically-insignificant foes; toss as he may, the attack is kept up until sleep is driven from the couch and the dawn is welcomed as a relief from torture. A musquito net is an obvious remedy for the annoyance, but as it is generally arranged it is not unfrequently a source of as much discomfort as the insect. The fixtures are either defective or else inconvenient, and in a short time the nets get disarranged and have to be renewed. In the accompanying engravings a plan is shown which allows the net to be readily opened or closed for entrance to or exit from the bed, and also allows the same to be made up again without tumbling the canopy. The arrangement is simply a set of light wooden bars (those shown in the engraving are made from a model which was not properly proportioned) connected together by a pivot at the center and furnished with a cord around their ends, over which the curtain or net is suspended.

Fig. 1.

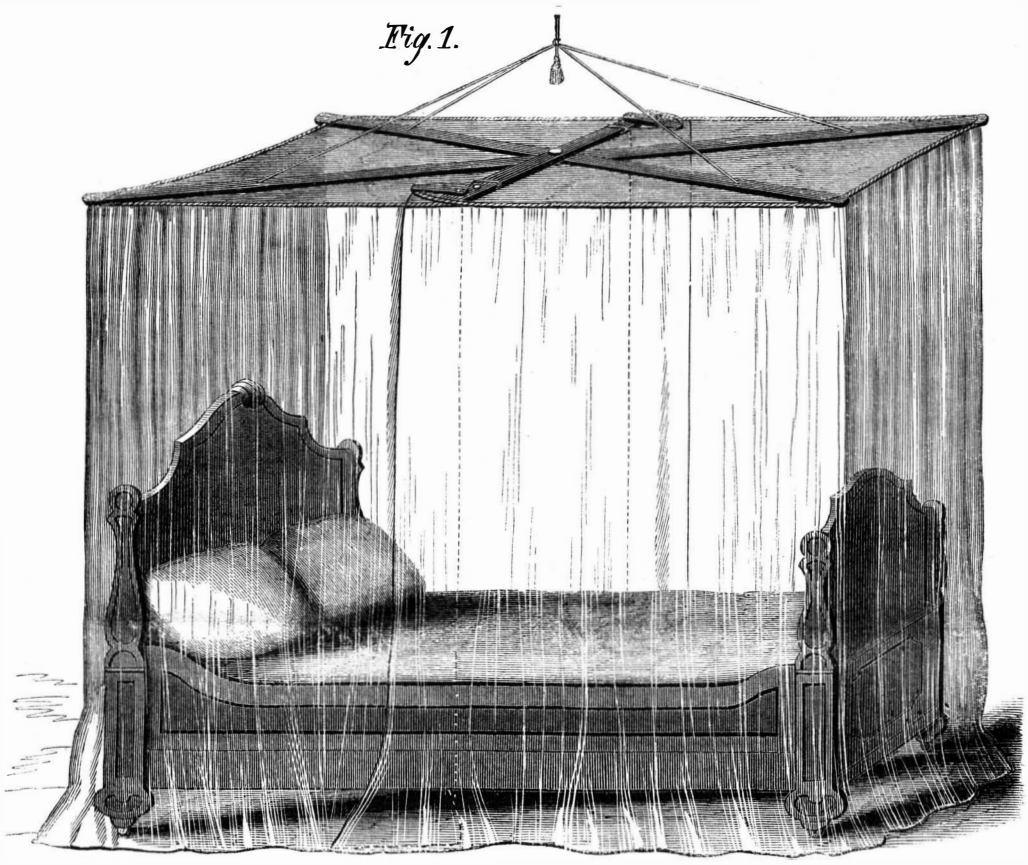
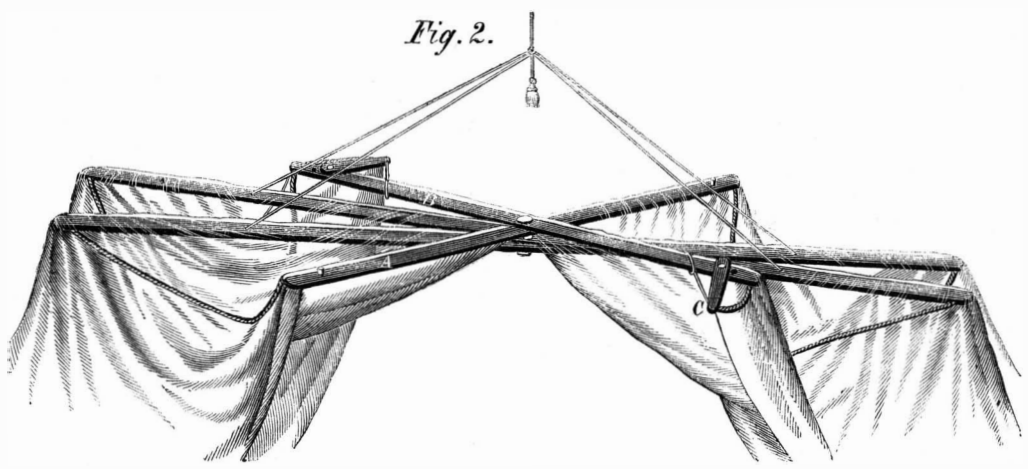


Fig. 2.




THOMPSON'S MUSQUITO CANOPY.

In Fig. 2 the net and bars are shown extended, and it will be seen that there are two pins, one in each end of the cross-bars, A, which fit holes in the bars, B. When these two are brought over each other, they are kept in place (by the pins) as shown in Fig. 1. The lap of the curtains is attained by having a shorter arm, C, which is so placed that by extending it, as shown in Fig. 1, the opening is effectually closed. In Fig. 2 the curtains are shown entirely clear of the bed. so that it can be made up without injuring the net, as before remarked. The canopy is raised and lowered by a cord and pulley overhead to effect these changes, which are soon made.

This invention was patented on the 23d of February, 1864, by M. L. Thompson, of Brooklyn, N. Y. State and county rights for sale. For further particulars address the patentee at No. 135 Montague street, Brooklyn, N. Y.

### The End of Breech-loading Cannon.

The folly of attempting to make large cannon breech-loading has at last become manifest to John Bull in spite even of his stubborn tenacity of purpose. The English *Army and Navy Gazette* says that at the Woolwich gun-factories the men are busily employed in converting the coil 70-pounders into muzzle-loaders; and that they are also preparing solid breech-pieces for the 110-pounders, which are intended to take the place of the present-vent pieces. The gun will be fired through a vent aperture on top in the usual manner.

WORKMEN, BE CAREFUL!—R. M. Davenport, while making a pattern in a lathe, at the works of J. Hunter & Co., at North Adams, Mass., had the chisel thrown out of the position in which he was holding it with such force that it entered his abdomen and made a wound which caused death in a few hours. This is the third sudden death which has occurred among the workmen in that establishment during the past eight weeks.

### How the Chinese make Dwarf Trees.

We have all known from childhood how the Chinese cramp their women's feet, and so manage to make them "keepers at home;" but how they contrive to grow miniature pines and oaks in flower-pots for half a century, has always been much of a secret. They aim first and last at the seat of vigorous growth, endeavoring to weaken it as far as may consist with the preservation of life. They begin at the beginning. Taking a young plant (say a seedling or cutting of a cedar) when only two or three inches high, they cut off its tap-root as soon as it has other rootlets enough to live upon, and replant it in a shallow earthen pot or pan. The end of the tap-root is generally made to rest on the bottom of the pan, or on a flat stone within it. Alluvial clay is then put into the pot, much of it in bits the size of beans, and just enough in kind and quantity to furnish a scanty nourishment to the plant. Water enough is given to keep it in growth, but not enough to excite a vigorous habit. So, likewise, in the application of light and heat. As the Chinese pride themselves on the shape of their miniature trees, they use strings, wires and pegs, and various other mechanical contrivances to promote symmetry of habit, or to fashion their pets into odd fancy figures. Thus, by the use of very shallow pots, the growth of the tap-roots is out of the question; by the use of poor soil and little of it, and little water, any strong growth is prevented. Then, too, the top and side roots being within easy reach of the gardener, are shortened by his pruning knife or seared with his hot iron. So the little tree, finding itself headed on every side, gives up the idea of strong growth, asking only for life, and just growth enough to live and look well. Accordingly, each new set of leaves becomes more and more stunted, the buds and rootlets are diminished in proportion, and at length a balance is established between every part of the tree, making it a dwarf in all respects. In some kinds of trees this end is reached in three or four years; in others ten or fifteen years are necessary. Such is fancy horticulture among the Celestials.—*The Technologist.*

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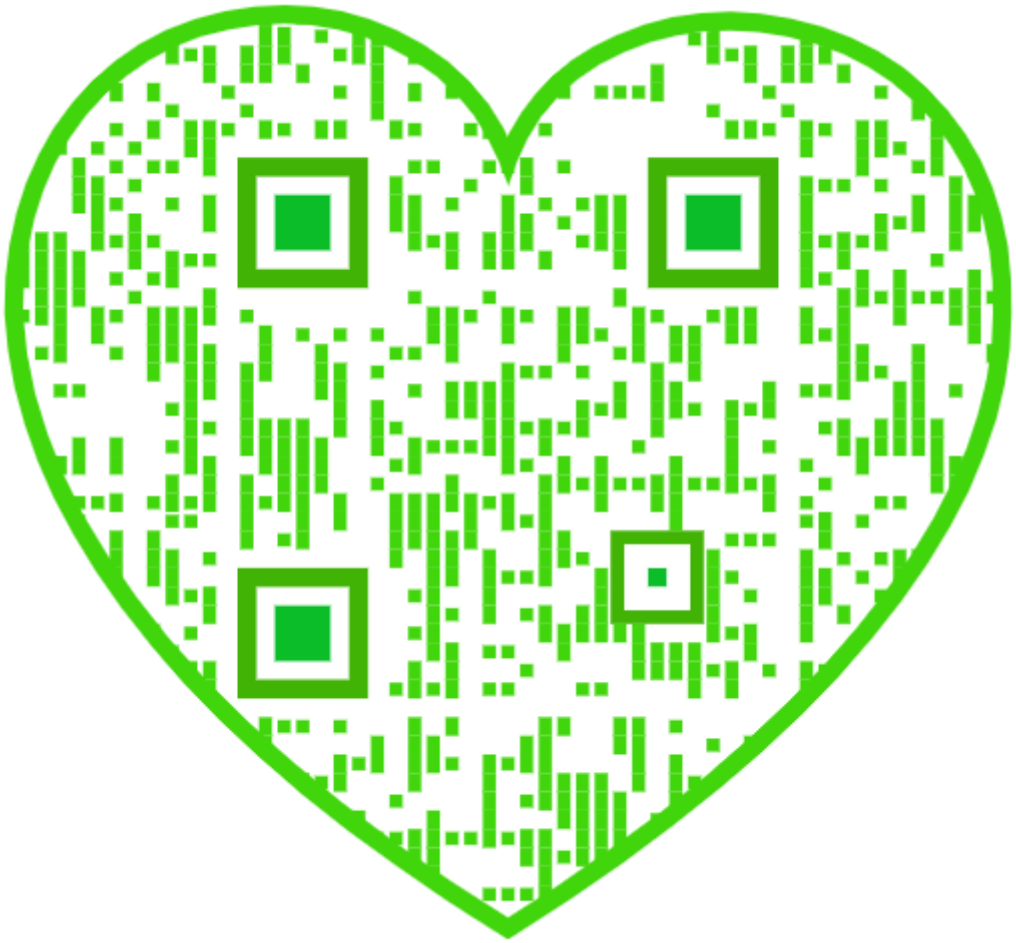

## FAIRBAIRN ON STEAM BOILERS.

William Fairbairn, C.E., LL.D., F.R.S., F.G.S., President of the Manchester Literary and Philosophical Society, Corresponding Member of the Institute of France, Member of the Royal Academy of Turin, Chevalier of the Legion of Honor, etc., etc., delivered in December last, to the members of the Literary and Philosophical Society at Newcastle-on-Tyne, a lecture from which we extract the portions that are of practical value:—

"In a previous communication I have already shown that the cylindrical boiler is the only form calculated to resist the elastic force of steam, and that the greatest care is necessary to be observed, not only as regards the strength of the plates, which should be of the best quality, equal to a tensile strain of twenty-one tuns per square inch, but they should be double-riveted, if we are to have a perfectly strong and well-constructed boiler. But before we enter upon the art of construction, allow me to direct your attention to some of the properties of steam as regards its temperature, pressure, volume and density, and we shall then have a more clear conception of the forces with which we have to deal, and how to regulate these forces, and construct vessels to retain them without risk to property, or any of those casualties which endanger life.

TABLE OF TEMPERATURES, VOLUMES, PRESSURE, ETC.

| | Pressure per square inch in lbs. | Corresponding temperature of Fahrenheit. | Relative volume of steam compared to volume of water that produced it. |
|---|---|---|---|
| Below the atmosphere | 1 | 102·9 | 20954 |
| | 5 | 161·4 | 4624 |
| | 10 | 192·4 | 2427 |
| | 15 | 213·0 | 1669 |
| Above the atmosphere | 1 | 216·4 | 1572 |
| | 5 | 228·3 | 1280 |
| | 10 | 240·7 | 1042 |
| | 15 | 251·2 | 882 |
| | 20 | 260·3 | 765 |
| | 22 | 273·7 | 727 |
| | 30 | 275·7 | 608 |
| | 50 | 299·1 | 434 |
| | 70 | 317·8 | 340 |
| | 90 | 332·2 | 281 |
| | 105 | 343·3 | 249 |
| | 135 | 360·8 | 203 |
| | 165 | 375·6 | 173 |
| | 180 | 382·3 | 161 |
| | 210 | 934·9 | 141 |
| | 225 | 400·1 | 313 |

"Now, as these forces have to be retained within comparatively small limits, we must endeavor to ascertain the force which tends to rupture a cylindrical boiler in the direction of its axis, or to separate the ends from the sides. To accomplish this we have only to multiply the area of the ends in inches, by the number of units of force applied to each superficial inch, and the result is the total divellent force in that direction. To resist this, we have the area or number of square inches of the plates in the circumference, as a counter-acting force, which, acting by tension, will retain the ends in their places so long as the strength of the iron or the riveted joints exceeds that of the internal force, or until the moment of rupture, when they become equal. Let us, for example, suppose a boiler of 6 feet diameter and 30 feet long, to be composed of $\frac{3}{8}$th-inch plates, whose ultimate strength is twenty-one tuns per square inch, and we have with steam of 60 lbs. pressure a force against each end of the boiler of 224,290 lb.=109 tuns. To this force we have a resistance equivalent to the areas of the plates 84·75×21=1779·75 tuns, which gives a large margin of strength, being in the ratio of 1779 : 109, or nearly as 16 : 1.

"This excess of strength is evidently great, but I have already shown by direct experiment that we must not calculate upon such a powerful resistance as twenty-one tuns per square inch, but must reduce it to the following standard, viz:—

"If we take the ratio of the strength of the plate at 100, we must reduce it for double riveting to 70, and for single riveting to 56, so that we have the resistance in the ratio of the numbers, 100, 70, and 56. Now, as very few boilers are double riveted, unless it be locomotives, we come to the standard of 56 instead of 100, and in place of the boiler being equal in its powers of resistance to 1779·75 tuns, as given above, it would burst with 996·6 tuns, being in the ratio of 996·6 : 109, or in other words, it is nine times stronger than the assumed pressure at which it is worked. This is not, however, the case as regards the curved sides, which have a tendency to rupture along the whole length of the cylinder upon each lineal unit of its diameter. With the forces in the direction calculated to divide the cylinder in halves, the resistance would be represented by multiplying the diameter by the force exerted on each unit of surface, and the product by the length of the cylinder, which gives the divellent force in that direction.

"Taking the boiler which we have selected, 30 feet long and 6 feet diameter, and plates $\frac{3}{8}$-inch thick, and we again have

$$\frac{72\times60\times360}{2240}=694 \text{ tuns}$$

as the pressure acting upon both sides of the circumference throughout its whole length.

"Now assuming that the plates with single-riveted joints are equal in their powers of resistance to 34,000 lbs., or about 15 tuns per square inch, we then have, according to the above rule, .375×360×2×15 =4,050 tuns as the force that would burst the boiler. It has, however, been shown that the collective force upon the longitudinal seams is only 694 tuns, consequently we have an excess of strength in the ratio of 4,050 : 694, or as 6 : 1 nearly. Now this is not too large a margin of security, but it is sufficient, provided the plates and workmanship are of the best quality, otherwise it would be desirable to have thicker plates. To this, however, I decidedly object, as there is no economy in the use of an inferior material; on the contrary, it is highly injurious as regards the transmission of heat, and not to be depended upon when composed of an inferior quality of iron. In every case of boiler construction it is essential that we should avoid the introduction of inferior plates, which in general partake more of the crystalline than the ductile character, and are therefore highly objectionable in the construction of boilers which have to resist so powerful an agent of destruction as the elastic force of steam.

"On this part of the subject I may advert to facts which I have stated before, that on referring to the comparative merits of the plates composing cylindrical vessels subjected to internal pressure, they will be found in this anomalous condition, that their strength in their longitudinal direction is twice that of the curvilinear direction. This appears by a comparison of the two forces, wherein we have shown that the ends of the 3-foot boiler, at 40 lbs. internal pressure, sustain 360 lbs. of longitudinal strain upon each inch of a plate a quarter of an inch thick; whereas plates of the same thickness have to bear in the curvilinear direction a strain of 720 lbs. This difference of strain is a difficulty not easily overcome, and all that we can accomplish in the case will be to exercise a sound judgment in crossing the joints, the quality of the workmanship, and the distribution of the material. For the attainment of these objects the following table, which exhibits the proportionate strength of cylindrical boiler, from 3 feet to 8 feet in diameter, may be useful :—

TABLE OF EQUAL STRENGTHS IN THE EXTERNAL SHELL OF BOILERS FROM 3 FEET TO 8 FEET DIAMETER, SHOWING THE THICKNESS OF METAL IN EACH RESPECTIVELY, FOR A BURSTING PRESSURE OF 450 LBS. TO THE SQUARE INCH.

| Diameter of boilers. | Bursting pressure equivalent to the ultimate strength of the riveted joint, as deduced from experiment, 34,000 lbs. to the square inch. | Thickness of the plates in decimal parts of an inch. |
|---|---|---|
| Ft. In. | | |
| 3 0 | 450 lbs. | ·250 |
| 3 6 | | ·291 |
| 4 0 | | ·333 |
| 4 6 | | ·376 |
| 5 0 | | ·416 |
| 5 6 | | ·458 |
| 6 0 | | ·500 |
| 6 6 | | ·541 |
| 7 0 | | ·583 |
| 7 6 | | ·625 |
| 8 0 | | ·666 |

[To be continued.]

## Utilizing Waste Flux from Galvanizing Works.

In the manufacture of galvanized iron a considerable quantity of either muriate of ammonia or sal ammoniac is used, the same being thrown upon the molten zinc; in a short time a dirty mass is produced, consisting mainly of chloride of zinc, oxide and carbonate of zinc, a little metallic zinc, and occasionally a trace of muriate of ammonia. This mixture has hitherto been of little use, and has been sold at a cheap rate mainly for reconversion into metallic zinc, and is generally known either as "waste or spent flux." To utilize this material, Mr. James Webster, of Birmingham, has patented an invention, according to which he takes any given quantity of the spent flux and macerates it in water for a convenient period, and when most of the chloride of zinc has dissolved he stirs up the solution, which causes the lighter particles of oxide or carbonate of zinc to be held in suspension in the liquor, he then draws this solution through a suitable strainer into a tank standing at a lower level, and, if necessary, repeats the process until the greater part of the chloride of zinc has become dissolved and run into the second tank. The fine particles of oxide or carbonate of zinc held in suspension in the solution in the second tank he allows to settle down, and draws off the supernatant liquor containing the chloride of zinc into a third tank, and then washes the precipitate in the second tank, and again runs the liquor into the third tank. The liquid in the third tank he now treats with ammoniacal liquor, such as the refuse of liquor from gas-works, which causes a precipitate of oxide of zinc, and leaves a solution of muriate of ammonia; this solution, when evaporated and crystallized in the ordinary way, may be used in the galvanizing works, or disposed of elsewhere. The precipitate left in the first tank would find a ready market among the refiners or others, at a higher price than the original spent flux; and the precipitate in the second and third tanks is, when properly dealt with, very suitable for paint.

## On the Removal of Stains from Silk.

A correspondent of the London *Pharmaceutical Journal* writes:—"Being anxious to discover some means by which the color could be restored that had been extracted from a violet silk dress by acid-juice having been accidentally thrown upon it, I applied to more than one chemist and druggist, thinking there must be some chemical agent which would restore violet, as spirit of hartshorn, it is well known, will restore black.

"Not being able to obtain any information on the subject, I thought of trying some experiments for myself; the first, proving successful, may be worth recording, if only to amuse the more learned with an account of the simple attempts of an amateur.

"Having recently superintended the 'iodine process' for annihilating a blot of marking-ink from linen, it occurred to me to try it on violet silk; the plan I adopted is as follows, and will serve as a recipe:—Brush the portion of fabric with tincture of iodine; then, after a few seconds, well saturate the spot with a solution of hyposulphate of soda, and dry gradually; the color is perfectly restored, and I consider my experiment highly satisfactory.

"I should have stated that it was knowing something of the chemical composition and properties of iodine that induced me to make the experiment which I have described."

## Restoration of Linseed Oil.

M. Fordred communicates to *Le Génie Industriel* a method, for which he has obtained a patent in France for restoring the sweetness to linseed oil that has become rancid. The plan is simply to force warm air through the oil, either by means of perforated tubes, or by means of a vessel with a false bottom pierced with numerous holes. The proper temperature for the air is between 110° and 127° centigrade, equal to 230° and 260° Fahrenheit. Sometimes a thick scum is formed at the commencement of the operation, but later this disappears. To prevent this scum from taking fire the vessel should be only half filled.

## What is Astrakan?

Many women the past winter have worn Astrakan without thinking what it is. Astrakan, as its name indicates, is an Asiatic invention. They couple a black ewe with a black ram. Before the dam has given birth to the young, she is killed and the lambs are taken from her womb. Their wool is jet black and of an extreme fineness. It costs very dear; there are Persians whose Astrakan bonnets are worth 500 francs ($100) a piece. This statement is worthy of notice by ladies who have false Astrakan—Astrakan the wool of which is long and dyed.—*Le Moniteur Illustre des Inventions.*

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## THE HECKER AND WATERMAN EXPERIMENTS.

We give this week the result of 4 experiments of 30 hours each, extending from May 17th to May 27th; the engine doing the same work in the same time in all of the experiments, and the steam being cut off at different points. In the first experiment of 30 hours the steam was cut off at—

⅞ths of the stroke.
⅔ds in the next.
½ in the next.
¼th in the next.

The regularity with which the engine was kept at constant duty is shown in the total number of revolutions of the engine and of the fan during each 30-hours' run. The total number of the revolutions of the engine during the 30 hours when the steam was cut off at—

⅞ths were 77,668
⅔ds were 77,625
½ were 77,627
¼th were 77,634

The fan is driven by a gear from the engine shaft, and the total number of revolutions of the fan during each experiment was in the—

⅞ths cut-off 123,229
⅔ds cut-off 123,128
½ cut-off 123,132
¼th cut-off 123,147

Now, what was the quantity of water evaporated, and what was the quantity of fuel consumed in doing the same amount of work with different measures of expansion? The following are the results. The number of pounds of water evaporated during the 30 hours in which the steam was cut off at—

⅞ths were 16,622
⅔ds were 14,981
½ were 14,568
¼th were 12,826

The pounds of fuel consumed, adding the coal and wood together, and deducting the ashes, were—

⅞ths cut-off 1,635
⅔ds cut-off 1,401
½ cut-off 1,374
¼th cut-off 1,245

In all of these experiments the steam was condensed, and the space around the cylinder was not heated with steam from the boiler. It will be seen that, under these conditions, a given amount of work could be done with considerable economy in the evaporation of water and in the consumption of fuel by working the steam expansively; the saving in cutting off at a quarter instead of seven-eighths being about 25 per cent.

It is to be remarked, however, that in order to perform the same amount of work in the same cylinder when cutting off at one-fourth and at seven-eighths, it was necessary to have the initial pressure of the steam much higher in the former case than in the latter. These were the mean initial pressures in the several experiments—

⅞ths cut-off 30·6
⅔ds cut-off 33·3
½ cut-off 38·1
¼th cut-off 53·9

Had the experiment with the cut-off at seven-eighths been tried with a smaller cylinder—a cylinder of such size as to yield the required power with steam at the pressure of 53·9 pounds per square inch—the result would have been different. As the proportion of the back pressure is smaller in working steam at high pressure, the advantage must have been less favorable to the short cut-off.

In all investigations the great danger is of drawing a general inference from too few facts, and this is especially the case in regard to working steam. There are so many elements in the problem that it is safe to infer only that the results will be the same under the same conditions.

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A NEW YORK gentleman, spending the summer at Stockbridge, Mass., owns and drives the horse that Stonewall Jackson used to ride.

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A CEMENT for sealing fruit cans is made by melting and stirring well together one pound of rosin and one ounce of tallow.

## Tobacco.

The Commissioner of Agriculture makes the following statements in relation to tobacco:—

"Tobacco was unknown to Europeans until after the discovery of America. Some sailors having been sent ashore in Cuba by Columbus, were surprised to see the natives of the island puffing smoke from their mouths and nostrils. They afterward learned that this was the smoke of the dried leaves of tobacco. This plant was extensively cultivated by the natives on the islands and the continent. There are numerous varieties of it—some mild and fragrant; others extremely pungent and fetid; some with a narrow, and others with a broad leaf, which is used in the manufacture of cigars. It is a perennial plant, with a flowering stem. Its botanical name is *Nicotiana*, of which genus there are as many as thirty species, only two of which—*Nicotiana Tobacum* and *Nicotiana Rustica*—are much cultivated for use. The specific name, *Tobacum*, is not, as has been supposed, a corruption of *Tobago* or *Tobasco*, whence it was brought, but, as Humboldt has shown, is the Haytian word for the pipe in which it is smoked. It was first introduced into Spain, in 1560, by Jean Nicot, from whom it derives its generic name. The practice of smoking it was introduced into England, in 1686, by Sir Walter Raleigh.

"Tobacco acts as a sedative, calming the nervous system and inviting to repose; but when used to excess, it produces nausea, debility, and sometimes death. Its active principle, which is procured either by distilling or burning its leaves, is a deadly poison. Its medicinal properties are very doubtful. The opinions of medical authors on this point are diametrically opposite. There can be no doubt, however, that the excessive use of it often shortens human life.

"The cultivation of tobacco has greatly increased in the United States during the last decade. In 1850 the quantity raised, as stated in the census report, was 199,752,655 pounds. In 1860 the quantity was 429,390,771 pounds. Some idea of the extent to which its production and manufacture enter into the industrial resources of the country may be formed from the fact that the value of tobacco in the leaf, exported in 1860, was $15,906,547; to which add manufactured tobacco exported, $3,372,964; total exports in 1860, $19,279,511.

"Tobacco is grown in all the States of the Union. Those, however, which are the chief producers are Virginia, Kentucky, Tennessee, Maryland, North Carolina, Ohio, and Missouri. The following statement shows the quantity produced in the above-named States in 1850 and 1860:—

| | 1850. | 1860. |
|---|---|---|
| Virginia | 56,803,227 pounds. | 123,967,757 pounds |
| Kentucky | 55,501,196 " | 108,102,433 " |
| Tennessee | 20,148,932 " | 38,931,277 " |
| Maryland | 21,407,497 " | 38,410,965 " |
| North Carolina | 11,984,786 " | 43,853,250 " |
| Ohio | 10,454,449 " | 25,528,972 " |
| Missouri | 17,113,784 " | 25,086,196 " |

## The Oldest Iron Ship.

We find this statement in the London *Engineer*:—"The *Richard Cobden*, said to be the oldest iron ship afloat, has entered the Brunswick graving dock, for the purpose of having her bottom cleaned and painted. She is now twenty years old, and has made twenty successful voyages to the East Indies; notwithstanding some rough usage, she has never made a drop of water, and her plates are apparently as sound as ever. On one occasion she took an entire cargo of iron from London to the East, while on her first voyage she ran aground and flattened her bottom to the extent of over three inches on one side of the keel. She commands the highest freights in Bombay, and her owners are so satisfied with her seaworthiness that they do not effect any insurance upon her. The cost of her repairs hitherto has been merely nominal. Messrs. Darby & Co., the principal owners of the Coalbrook-dale Iron Works, gave the order for her construction twenty-one years ago, to Messrs. J. Hodgson and Company, of Liverpool, for the purpose of testing the capabilities of iron as a shipbuilding material. The result is evident, and while the *Richard Cobden* is still as serviceable as ever, there are now no less than 76,000 tuns of iron shipping in Liverpool alone."

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AT a recent cheese convention at Rome, N. Y., there were represented 64 cheese factories, employing 38,679 cows.

## The Explosion at Tripoli.

Telegrams have reached Malta, from Tripoli, announcing the explosion there on the 30th of May, at 2.30 P. M., of a Government powder magazine, from the effects of which 517 persons lost their lives, of which number 500 are Ottomans. So severely did the shock affect the dwellings in the town that the inmates had in great part abandoned them and sought safety on board the ships in port. The telegraph station suffered damage, and ceased working, after communicating the intelligence to Malta, until such time as the rubbish could be removed from off the instruments. Of the Europeans only 12 laboring Maltese and 5 Jews were among the victims. No other particulars are as yet known. A subsequent telegram from the Governor of Tripoli reports the killed as not exceeding 150, with the destruction of the Spanish fort, the Custom-house, and adjacent stores. The British Consulate has also suffered, two 18-pound shot having fallen through the roof. Had the accident happened some few days before, when much more powder was in the fort, the entire town would have been destroyed.

## A Tree hewn by Bullets.

"Most people," says the Richmond *Enquirer*, "have doubted the literal accuracy of the despatch concerning the battle of Spottsylvania, which alleged that trees were cut down under the concentrated fire of minie balls. We doubted the literal fact ourselves, and would doubt it still but for the indisputable testimony of Dr. Charles Macgill, an eye-witness of the battle. The tree stood in the rear of our breast-works, at a point upon which at one time the most murderous musketry fire that ever was heard of was directed. The tree fell inside our works, and injured several of our men. After the battle, Dr. Macgill measured the trunk, and found it twenty-two inches through, and sixty-one inches in circumferences, actually hacked through by the awful avalanche of bullets packing against it. The foliage of the tree was trimmed away as effectually as though an army of locusts had swarmed in its branches. A grasshopper could not have lived through the pelting of that leaden storm, and but for the fact that our troops were protected by breastworks, they would have been swept away to a man."

## A Substitute for Brandy in cases of Exhaustion.

In the "Transactions of the Obstetrical Society," London, Dr. Druitt recommends for this purpose lean beef, chopped up, inclosed in a jar and subjected for an hour or more to heat, when it will separate into three portions, fat, fiber and liquid essence. Strain off the last and separate the fat by means of blotting-paper, when a clear amber liquid is obtained of an intensely aromatic smell and flavor, very stimulating to the brain. Different samples of meat yield different quantities of it, and it contains a variable proportion of gelatinous matter. It yields on evaporation about one-sixteenth of solid residue which soon effervesces on exposure to the air from the saline matters contained. This is not intended as a substitute for common beef-tea, but it is recommended as an auxiliary to and partial substitute for brandy in all cases of great exhaustion or weakness, attended with cerebral depression. It is free from bulk and exerts a rapid stimulating power over the brain. In the sequelæ of severe and exhausting labor it is invaluable.

## Relative Sizes of Ultimate Atoms.

Professor Gustavus Hinrichs, of Iowa State University, communicates to *Silliman's Journal* an article on the distribution of the dark lines in the spectra of the elements, in which he reasons from the few facts yet known that these lines will probably be found at regular intervals in their spectra. He concludes that the lines must be produced by the bulk of the particles or atoms, and that an exact knowledge of the laws and distances of their distribution must lead to a knowledge of the relative dimensions of the atoms themselves, in length, breadth and thickness. He remarks:—"Thus optics will give us the form and size as chemistry has given us the weight of the atoms."

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REVOLVING horse-rakes have just been introduced into France

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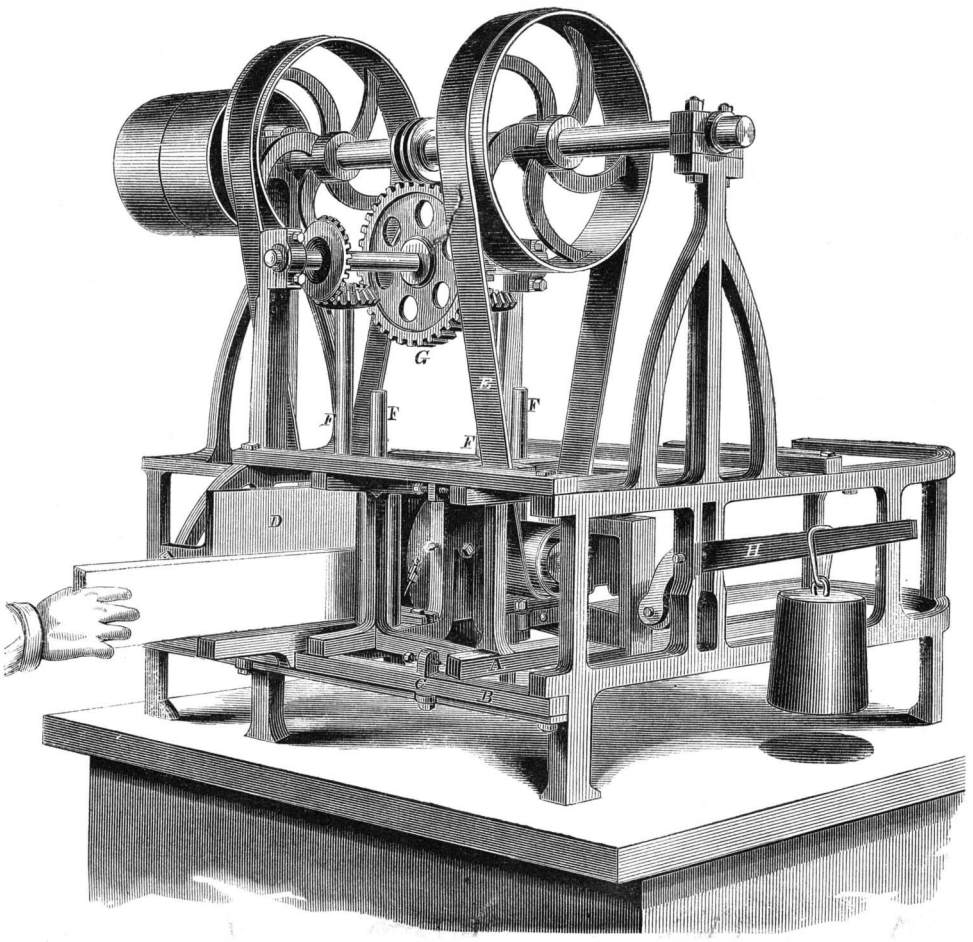
### Improved Shingle Planing Machine.

This machine is intended for planing the surfaces of shingles; by passing through this operation the shingles last much longer, for the reason that rain and moisture generally is more easily shed from smooth surfaces than rough ones. The roof, therefore, dries quicker and decay is much retarded. The machine is simple in its construction and operation. The principal feature is a movable frame, A, which is placed within the main framing of the machine. This movable frame slides on the ways, B, on which there is a stop, C, and a set screw to gage the distance to which the frame, A, moves. The motion of the frame, A, is not uniform, but irregular, to suit the shape of the shingle, which is, as all know, thinner at one end than at the other. The frame, A, has therefore a long arm on one side which works on a center, so that as the shingle is pushed in toward this joint the opening is exactly suited to the angle formed by the shape of the shingle, and when it is withdrawn there is a weighted lever, H, which returns the frame to its first position. There is a face-plate, D, on one side, against which the shingle bears, and there are two sets of revolving cutters set in a wheel driven by the belts, E, which shave both faces at once. The edges have been trimmed previously. To feed the shingle in there are four upright cylinders whose shafts may be seen at F. These rolls are worked by the worm-wheel and gears at G. The lever, H, also keeps a uniform pressure on the shingle so that it is planed even and true. Any degree of taper required can be planed on this machine, and it needs no extra hand to run it, for the man who edges the shingle can also run it through this planer and face it before laying it down. The operation is fully explained by the engraving itself, nothing is required but to run the work through as shown by the hand; it then issues on the opposite side completely planed. Two patents have been granted on this machine. They bear date January 29th and February 19, 1861. For further information address the inventor, Philip H. Woolsey, of Kingston, N. Y., or S. C. Hills, Agent, No. 12 Platt street, New York. State and county rights for sale.




WOOLSEY'S SHINGLE PLANING MACHINE.

### Pradal's Perfumery.

The great industrial publisher, Henry Carey Baird, of Philadelphia, has just issued a translation of Pradal's standard treatise on perfumery. The work is translated and edited by Prof. H. Dussauce, of New Lebanon, N. Y. It forms a book of 534 pages, and is printed in large clear type on excellent paper. It is a complete treatise, giving full instructions for making the various kinds of perfumes, pomades, paints, cosmetics, dentifrices, toilet vinegars, and toilet soaps. From the chapter on the history of perfumery we take an extract giving the origin of the famous Frangipani:—

"A perfume in common use, even to this day, was the invention of one of the earliest of the Roman nobles, named Frangipani, and still bears his name. It is a powder or sachet composed of every known spice in equal proportions, to which is added ground orris or orris root, in weight equal to the whole, with one per cent of musk or civet. A liquid of the same name, invented by his grandson, Mercutio Frangipani, is prepared by digesting the Frangipani powder in rectified spirit, which dissolves the fragrant principles."

### The "Scientific American."

This invaluable paper—which grows better, handsomer, and more absolutely necessary to educated men and mechanics with each succeeding volume—begins a new volume in July. It is now the Government organ for printing reports of trials of artillery; reports and illustrations of all the damages and proved excellencies of our iron-clads as developed by battle; reports and illustrations of Government experiments with steam boilers, ships, plates, screws, and war machinery, and much other scientific matter collected by Government, which no other paper is permitted to publish. Beside, we need hardly say that all new inventions—all new arts, sciences, and machinery, in mechanics, in philosophy, and particularly in agriculture—are explained and beautifully illustrated in its columns. We are glad to notice that the number sold in this city by our news-dealers, and received by subscribers is steadily increasing. It is as good as a finished school-teacher in every family, and better than a good foreman in every factory, machine-shop, or other mechanical establishment.—*Grand Rapids Daily Eagle, Mich., June* 23, 1864.

### How Lee repairs his Broken Railroads.

The facility with which General Lee repairs his railroads, after they have been torn up by our cavalry raiders, is accounted for by facts, the truth of which is undoubted. General Lee has, in conjunction with several English railroad engineers, organized a corps of railroad constructors, which has this matter in hand. Large supplies of new railroad iron have been received from abroad and placed at convenient points, and duplicates of all important bridges are also on hand. With this agency and these means, the damage which can be done is rendered merely temporary; and it is quite certain that the rebels were able, in a marvelously short space, to put in running order both the Virginia Central and the Lynchburg roads. It can hardly be claimed, therefore, that the enemy's communications are to-day in any respect seriously embarrassed.

### Gunpowder.

Captain Edward Schultze, of Potsdam, England, has invented an improved mode of manufacturing gunpowder. He proposes to take the natural grown-up trunks of trees, clear them from the roots and the bark, and cut these trunks into thin plates of the diameter of the trunks themselves. These timber-plates are cut by machinery into little grains of equal length and breadth with the thickness of the plates. The timber grains so obtained will become the powder grains. The first object of the chemical labor is to obtain the grains as porous as possible, and to clear them from all external mechanical substances. This is obtained by treating the grains with alkalies in a state of boiling heat, and next, to change the incombustible timber grains into flammable, not explosive, grains. This is obtained by the application of chloride, and then of nitrous acid; these grains are made explosive by nitrate of potash, and in some instances by "kaliferrohydrocy anicum." The proportions are varied according to the purposes for which the powder is to be used. In case the powder is to have a more gradually-acting, not very explosive, force, the first combustible material (namely, the flammable but not explosive grains) will be ground into dust. This dust is then treated by the same process of the above-mentioned mixtures to produce the explosive powder. From the matter so obtained a kind of cake of relative strength is produced by means of pressure, and these cakes are the material from which, by the necessary machinery, the powdered grains will be obtained.

### Economy of Fuel.

On page 344, Vol. IX., of the Scientific American, we published an illustration of a furnace for steam boilers, invented by Mr. Henry Gerner. Mr. Gerner is a civil engineer who has paid particular attention to the burning of fuel and heating of water, and he makes it a business to give instructions for improving furnaces already built as well as for constructing new ones. In view of the wasteful manner in which fuel is burned in most furnaces it is probable that very great economy might be effected by alterations made under intelligent directions. We have conceived a very favorable opinion of Mr. Gerner, and some of his recommendations, and particularly that of Prof. Seely, a well-known chemist of this city, will be found in his advertisement on another page. We are informed that a large company is being organized to manufacture his furnaces. The matter is one worthy of general attention.

### SPECIAL NOTICES.

James Young, of Manchester, England, has petitioned for the extension of a patent granted to him on Oct. 7, 1850, for an improvement in making paraffine oil.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, Sept. 19, 1864.

All persons interested are required to appear and show cause why said petition should not be granted. Persons opposing the extension are required to file their testimony in writing, at least twenty days before the final hearing.

A Pleasing State of Things.—A Montreal paper has discovered the startling fact that two hundred tuns of gunpowder are stored in one building in close proximity to the city; and has been informed that the drivers of powder-wagons in the neighborhood frequently solace themselves with a cheering pipe, besides conveying matches into the magazine. Some day one may write "Montreal *fuit*."

Messrs. Suer & Strong, of Ashtabula, Ohio, wish to obtain the address of parties making machinery for steam cider-mills.

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### A Large Blast.

Ardsheal quarry is situated on the banks of Loch-Linnhe, in Argylshire, Scotland. It was opened about six years ago by Mr. Sim, of Glasgow, and is capable of affording an inexhaustible supply of excellent granite, which is now finding its way to assist in the formation of the new harbor works at Greenock, the Thames embankment, and also for the paving of the streets of London and Liverpool.

To meet the growing demand for this most valuable material, mines for the reception of the powder were commenced some time ago, and brought to a completion on the 7th of June. The hight of the quarry face was 42 feet above the level of the quarry floor, and at a point 70 feet back from the face, and 72 feet above the level of the floor, a vertical shaft about 4 feet square was sunk from the surface of the mountain to a depth of 45 feet. At the bottom of this shaft a mine or heading was driven at a right angle in a parallel line with the quarry face. This heading was 25 feet in length, and 70 feet from the face of the quarry. At the end of this heading the chamber to contain the gunpowder branched off at a right angle towards the front. The chamber was hewn out of the solid rock somewhat in the form of a large balloon. The gunpowder was then carefully let down in bags, each containing 25 lbs. weight; these were received by a man stationed at the bottom of the shaft, and passed on to be deposited in the gunpowder chamber. In this way two tuns of gunpowder were safely deposited, but as this operation had to be effected in darkness, all connection between the gunpowder and the heading was stopped, so as to permit of light being freely used, to enable the miner to complete the important operation of stemming up the mines. An unexpected difficulty here presented itself, in so far that the air in the heading, notwithstanding the constant application of a powerful air-pump, had become so vitiated that the light within a lantern could not live. Subsequently, it was found possible to use candles. From this time onwards the work of stemming the mines and shaft went on night and day without interruption. At 7 o'clock on the evening of Thursday week, the safety fuses were ignited, and in 30 minutes the explosion took place, causing the very mountain to groan and quiver, and bringing with it upwards of 20,000 tuns of most excellent granite. The workmen's houses, situated within 100 yards of the quarry face, sustained no injury. The blast was by no means a small one, and it was very creditable to all engaged that it was accomplished without the slightest accident.

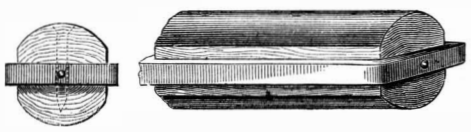
## BORING TOOLS.

NUMBER 2.

The engravings considered in our last article on this subject (see page No. 2, of the current volume), represent roughing tools of one kind, and are intended chiefly to bore out the heaviest portion of the metal to prepare it for finer tools, or those which by working with lighter cuts and sharper edges leave smoother surfaces. To produce a smooth surface in iron sometimes a scraping tool called a bit is used, as shown in Fig. 7, and in other cases the tool shown in Fig. 3 is modified and shaped as in Fig. 6; both amount to virtually the same thing. The bit is merely a flat steel bar with an iron shank. The edges of the bar are turned to the proper size and then filed up so as to clear behind. The extreme ends are slightly rounded and the size a little smaller for half an inch along the length of the bit, so that the tool will have a fair entrance in the work. The pieces of wood on the back are either beech or hickory, well seasoned and fastened to each other by screws passing through

*Fig. 6*

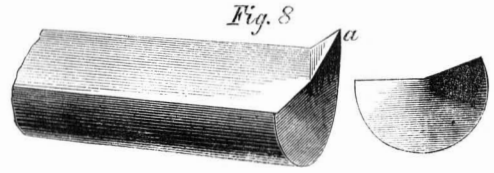
*Fig. 7*



holes in the steel. With a properly-made bit the most beautiful holes, true and smooth as it is possible to conceive of, may be produced. There is no limit to the size of them, within reason. We have seen bits of twenty inches in diameter used in the largest workshop in the country with excellent results. The pieces of wood are intended to steady the cutter, as every mechanic knows, and it is not "just as good" to pack them up with paper or thin board when they get worn down, as they will after a while. Two pieces of wood is all that should be used, for when packing is placed beneath it gets loose and shackly, and the cutter does not work as it should. In the engraving the wood is rather short; it should come up to the end, or else there will be no support for the bit when first started.

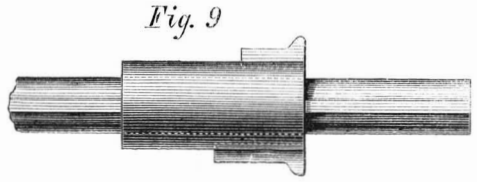
This is not a new tool by any means. It is a very old and well-tried one, and while we advocate progress in everything, we do not reject good tools because they happen to be old for the sake of new ones, simply because they are new. A substitute for this tool is found in the steel bar shown in Fig. 7. It is called by some a pod auger, but is not capable of doing as fine work as the wooden-backed flat bit, while it is much more costly to make and repair. This is one form of a pod auger (Fig. 8).

*Fig. 8*




The shape is sometimes varied slightly at the cutting end, *a*, but not enough to warrant a number of diagrams. The pod or body of this tool is a true circle, and the cutting part is merely a sharp strong fleam, or steel edge, projecting forward so as to clear the front end of the pod and give a cut to it. This tool will take hold only after a recess has been made for it by a drill if the work is not cored out; if it is cored out the boring tool must be employed to bore out a portion of the hole so that there will be a true circle for the bit to start in. It is necessary also to have a dog on the shank so that the tool cannot turn, or else to square the extreme end and put a tap wrench over it to effect the same object.

*Fig. 9*



A much better, though more costly instrument, is illustrated in Fig. 9. It is a very useful and complete one; and when properly made will do excellent work. For boring pulleys or light hollow work of any kind, such as small cylinders, valve-seats, steam chests, cocks, etc., it has no equal. It cuts double as much as a pod auger can, and may (by increasing the number of the cutters to four) be made to carry a chip that no other tool will stand. The cutters must not all be set to the same diameter, but one inside of the other, so that while each will remove only a small chip the aggregate amount of iron cut out will be as much as the belt will drive, or the chucks hold without slipping. The manner of using and making it is simply this:—The mandrel is solid and made of steel; it has centers in each end and also a key-way or slot cut in it through the whole length. The shell fits this mandrel nicely and has dove-tailed seats for the cutters, and a steel feather to fit the slot in the mandrel. There may be a number of cutters and the last one may be set to take a second cut, so that the job will only require two cuts in all to finish it completely.

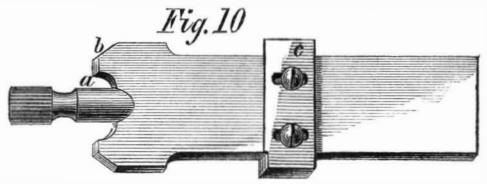
It is not possible to take a fine cut in connection with a heavy one and have the work true, for no matter how well the shell may be fitted to the bar, the heavy cut will jar the light one so that the main object of it is defeated. We can take what we have called a "second cut," which means to follow the first roughing cutter with one set not quite so rank, so that when the shell has traversed the hole it will be nearly smooth; and certainly round and true. When the real finishing cut comes, the hole ought to be perfect.

The bar is to be set between the centers of a lathe, and the square end of a tool placed against the back part of the shell so as to force it along when the feed is thrown into gear on the slide-rest carriage. The hole need not be previously made true with a boring tool as it must with the pod auger.

Some lathes have a chronic indisposition to bore parallel holes. This is most annoying to those who like to have their work done well and quickly. The trouble is caused by the spindle not being parallel with the slides on the shears. A simple way of remedying the defect is to take up the back-head and put in a lining between it and the V of the slide it sets on. The lining must of course be so placed as to throw the spindle true, and the amount required will depend on the irregularity the lathe has. But with the "shell arbor" which we have just described, it makes no difference how much the lathe bores out of truth, for the truth of the bore depends altogether upon the position of the centers in the head-stocks of the machine—if these are exactly in line with the spindle (and they can easily be brought so), the tool under discussion will make a positively true hole, and if a tapering orifice is desired it is quite as readily produced by setting the tail stock of the lathe over to the desired point. It is difficult to conceive of any one tool more useful than this, or one capable of greater changes or applications compared with its first cost. It is really indispensable to every well-ordered machine-shop, and the intelligent mechanic will discover many nice points in the details of its construction, which we have omitted simply because we cannot devote too much time to one tool alone.

There are very many instances in the operations of the machine shop where special tools can be employed to great advantnge. When large numbers of valve-seats and their chambers have to be made of an exact size, as it often happens in marine work, a tool which would make every one a fac-simile of the other, as regards the bevel of the seat, its distance from the outer flanges and the diameter of the hole the lower stem of the valve works in, would be of great service. With the permission of Mr. Victor Upham, foreman of the finishing shop in the Novelty Works, in this city, we present in Fig. 10 a plan of such a tool. The credit of originating it belongs to Mr. Upham, and we can testify to its being a great economizer of time, as well as doing the work in a superior manner.

*Fig. 10*




The work is roughed out first to nearly the size required by the drawing, and the hole for the valve spindle also bored. At the end of the bit there is a short rimmer and immediately above it a solid shank, *a*, which fits the rimmed hole and steadies the bit while at work, so that the seat, which is cut by the edges, *b*, will be smooth and free from chatters or irregularities. The cutter, *c*, is on the same line as the other cutting edges, being made to span the body of the bit in the position shown in the engraving.

### Explosion of Gun-cotton.

Dr. Phipson has addressed the following note to the *Mining Journal:*—"I see in the newspapers that a terrible explosion of gun-cotton, accompanied by loss of life, has lately occurred in the works of Messrs. Prentice & Co. It is supposed to have been caused by a spark from some steel machinery. Photographers will remember that, a year or so ago, the photographic chemist Dornbach lost his life by an explosion of gun cotton, while packing this substance into a cask by means of a wooden pole. Since this sad occurrence I have already twice stated that the explosion which killed M. Leon Dornbach was evidently caused by an electric spark. Persons who handle gun-cotton are apt to forget (or, perhaps, are not always aware) that it is one of the most electrical substances known, and that friction, far too slight to develope heat enough to inflame it, will develope in gun-cotton so considerable an electric tension that electric sparks may be obtained from it."

FOREIGN painters now very generally adopt the plan of photographing their model figures in their studios, and afterwards painting from them, as the draperies can then be more accurately copied.

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## Correspondence.

### Our Special Correspondence.

MANUFACTURING BUSINESS IN SCHENECTADY.

MESSRS. EDITORS:—Our venerable town is putting on a new and modern dress; signs of improvement and thrift are to be seen in many parts of the city. A public-school system is maintained upon a generous scale, with departments for completing the education of young men and women for every walk of life. It is under the government of a principal whose authority extends over more than 1,500 pupils, and its reputation draws many families to reside here in order to give their children a superior education. Union College (or rather Dr. Mott, its head) has provided a college course for those graduates of the school who are "up head" in their classes, or who show decided merit. Schenectady will soon have the best educated community in the State. Her citizens have shown much wisdom in making such ample provision for the free education of their children, and it is partly owing to this fact that the city is growing so fast in her business and manufactures. It must be a favorite residence for mechanics and all people of industry. We have been able to make a few inquiries into the character and condition of some of the shops and factories during our short visit here. Among those established within a few years is G. Westinghouse & Co's factory for agricultural implements. Some of the machines made by them are the invention of the head of the firm, whose "thrasher and cleaner and separator," secured to him by several patents, are improvements of much merit and popularity. This firm makes horse-powers, thrashers and cleaners and separators, clover-hulling and cleaning machines, cross-cut sawing machines, and portable cider-mills and presses, broom-corn scrapers, etc. They send their productions far and near throughout the land. Among other merits of the head of this firm is the notable one that he has three sons in the war for the Union.

The shawl factory of Schenectady is said to turn out nearly one million dollars' worth of goods annually. It gives work to many people outside of its walls, who furnish the articles for market. The superintendent, Mr. Hunter, was absent from the city on business, and we took only a general survey of the establishment.

The broom factories of Schenectady are a great feature of its industry. The richness of the soil of the Mohawk Valley attracted the cultivators of broom-corn to this region twenty-five or thirty years ago, and the business has been growing ever since. Millions of brooms are made here and in the vicinity. We have wondered why so little automatic machinery is used in making brooms. They are made in a lathe which does not do much more than hold the stock and the handle together while the workman, who sits before it, wires and sews the broom. The work is laborous and requires the strength of a man. We happen to know that efforts are being made to alter this state of things, and before long the Patent Office will be called upon to examine a lathe which is designed to do this work automatically, with the aid only of a girl.

The machine shop and foundry of Clute Brothers has a wide reputation. It occupies a building used as a wind-mill in early days. Their business taxes the utmost resources of their establishment, and we were told they needed fifty more men at once. They are now largely engaged in making such parts of the monitors and other Government war-vessels as can be made away from the ship-yards, and we were shown the model of a "torpedo steamer" which the firm is building for the Government. The inventor, Mr. Lay, of the navy, is directing the work, the character of which we are not at liberty to reveal. We saw enough of the monster to convince us that no craft, whether she be a *Warrior*, *La Gloire* or any other iron-clad, could live in its vicinity.

The carriage and car-spring factory of Bashyot & Greenhalgh has grown from a small beginning to large proportions. It sends its work to many distant States, and uses immense quantities of the best steel. Both partners are practical mechanics, blacksmiths, whose education in their art and trade made them early in life foremost among their fellows. Although their business is now very extensive, they are yet to be found every day in work-habiliments, and distinguished from their workmen only by the control they are seen to exercise and not by any "dressed-up" appearance. There are of course no specimens of poor work in their shop.

The locomotive works is still as prosperous as ever. Five hundred men are employed there, and they have work ordered for two years ahead. But we must leave our account unfinished, and yet we may have said enough to show that Schenectady is about to lose its quiet character and become one of the busy workshops of our State.

Schenectady, N. Y., June 10, 1864.

### The Balla Tree.

MESSRS. EDITORS:—In the SCIENTIFIC AMERICAN, page 227, Vol. X., I observe an article relating to the milk of the valata or balla tree. I herewith enclose you a small piece which has been dried on a heated iron plate. This tree is very large, and not a shrub as stated by Mons. Serres. The manner of obtaining the gum is very simple—by cutting down the tree; and, as it lies on the grounnd, it is girdled every eight or ten feet, then vessels placed under it where girdled, and in a few hours the bark is dry. The juice comes from the bark only. I have to say, in relation to the juice being drinkable, that it is palatable enough; but in case a person should drink a table-spoonful and soon after take any kind of alcoholic liquor it would prove fatal; for the milk of the balla tree coagulates instantaneously in low-proof rum, and, so far as I have tried it, cannot be rendered liquid again. Nearly the whole crew of a ship's company were killed here a few years since by using it in their coffee. By the first opportunity, I shall forward to my brother, C. W. Sawyer, Charlestown, Mass., a quantity of the pure juice, and will request him to send you a can, if desired. I have coated wires by simply running them through the milk, first covering them with twine or cloth saturated with alcohol. It remained very flexible.

This colony abounds with these trees, and most of the houses in this city are built of the wood which, in Dutch parlance, is called "Horse-flesh Wood," as it resembles it in color.

There is no milk exported from here, and but very little notice has as yet been taken of it. Any further particulars I shall be happy to give you or any other person interested. HENRY SAWYER,

United States Consulate, Port of Paramaribo,
Colony of Surinam,
Duton, Surinam, May 17, 1864.

[If the sample sent us be the product of the valata tree it does not appear to be in any way a substitute for gutta-percha. For making textile fabrics waterproof it may be useful, and there are doubtless many other places where it can be used advantageously. It has but little elasticity or strength, but this may be owing to a defective method of treating it. It would seem to be valuable for covering the rolls of clothes-wringing machines, and as this is a very important branch of manufacture, parties interested should inquire. Samples can be seen in this office.—EDS.

### Cattle Disease in England.

A committee of the British Parliament has been taking testimony in regard to the propriety of passing a law to prevent the spread of pleuro-pneumonia, small-pox and other diseases among cattle, and they called upon Professor Simonds, of the Royal Veterinary College, who made the following interesting statements:—

"Sheep-pox was a highly contagious disease. During the time of incubation it was impossible to detect it, and an animal contracting a disease on the continent might not show it until it arrived in this country. It was, therefore, desirable that no sheep from a flock, part of which had sheep-pox, should be imported. The provisions of the 'Cattle Disease Prevention Bill' were necessary for preventing the spread of the disease. Pleuro-pneumonia was a contagious disease, and the loss depended upon the treatment of the animal. The loss of animals by pleuro-pneumonia was comparatively trifling. He was satisfied that the disease was infectious. The circumstance of the disease appearing here without importation tended to show that it could, like cholera, be caused by atmospherical influence. The contagion very much depended upon the severity of the attack; a beast in an advanced stage of the disease communicating it much more readily than an animal with a slight attack. A man with any practical knowledge of cattle could detect whether or not the animal was suffering from lung disease. He believed that all legislative measures for the prevention of this disease would fail; and he had come to the conclusion that they could not legislate for pleuro-pneumonia, like a disease which was simply contagious. Within the last four or five years that disease had made its appearance in Australia. He believed the bill before the committee to be stringent with regard to pleuro-pneumonia. There would be an advantage in cleansing railway trucks, as there was no doubt that if trucks were not kept thoroughly clean great mischief might be done. He thought the clause which gave power to inspectors to exclude diseased beasts from the markets was very advantageous. A person had no right to send into a store market an animal affected with pleuro-pneumonia, and therefore ought to be subjected to a penalty. Mouth disease was prevalert among cattle, but not nearly so prevalent as it had been. He had heard that on the market-day which followed the great metropolitan market-day, fully half of the beasts were affected with that disease. He thought the clause applying to mouth disease was perfectly inapplicable, and if used it would increase the price of meat by at least 25 per cent. He did not consider that the disease had been imported from abroad. It made its first appearance in the year 1839, in the county of Norfolk. Steppe murrain was about the most contagious disease known, and was of such a character as to warrant legislation upon the subject. He did not think it possible, except under peculiar circumstances, to have a separate market for diseased animals. It was impossible in any large fair or market to carry out a perfect inspection. The risk of having the animals turned out, and the penalty, would tend in a great measure to prevent diseased animals being taken to the market. He thought the clauses of the bill right with regard to glanders, sheep-pox, and steppe murrain; but he did not consider that the provision applying to pleuro-pneumonia was proper; if carried out it would, in his opinion, prove highly disadvantageous to the country. The ordinary period of incubation in pleuro-pneumonia was about a month, during which time it was impossible to detect its presence. He did not think it prudent to allow animals affected with pleuro-pneumonia to go into fairs or markets. He would not apply the orders in council to scab. He believed that if fairs were inspected it would have a beneficial effect. It was very desirable that horses suffering from glanders should not be permitted to be sent into the markets, as the disease was not only communicable to other horses, but also to human beings. Selling glandered horses in a public place was an indictable offense, and he saw no reason why the law should not be extended to persons selling glandered horses anywhere. Inoculation was useful to prevent the spread of small-pox in sheep; he had himself inoculated upwards of 3,000 sheep, and he had seen many thousands subjected to the operation. The effect was to reduce the mortality, which, in the natural progress of the disease, would be 40, 50, and even 75 per cent to 4 per cent, and frequently very much less. What was called inoculation for pleuro-pneumonia was not really inoculation, as there was no conveyance of the disease to the sound cattle, and all that was done was no more in effect than would be done by the introduction of an ordinary seton. The foot-and-mouth disease was very rarely fatal. Small-pox in sheep could not be communicated in any way to human beings, or even to the goat, which was so nearly allied to the sheep."

VIOLET COLORS FROM IODINE;—Prof. Hoffman has patented in England the process of manufacturing a new color, obtained from iodine, which affords several beautiful varieties of violet. The material, which is to be used for dying, is made by mixing rosaline with the iodides of ethyl, methyl or amyl.

FIFTY thousand Canadian acres have been planted with flax this year, against five thousand the last year. A result of the cotton famine.

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### A Calculating Machine at the Dudley Observatory.

We have received the report for 1863 of G. W. Hough, the astronomer in charge of the Dudley Observatory at Albany. From his description of the calculating machine in use at the observatory we make some extracts which may enable some of our readers to get an idea of the principle of the machine:—

"It is a well known fact that Mr. Charles E. Babbage was the first to attempt the construction of a difference engine; but owing to some misunderstanding between the inventor and the English Government, under whose patronage the work was carried on, it was never completed.

"About the year 1834 or 1836, Mr. Schentz, a printer at Stockholm, heard of Mr. Babbage's machine, and at once conceived the idea of building one himself.

"The present machine, which bears the impression 'Stockholm, 1853,' is the product of his labors, continued with unwearied diligence and at great pecuniary sacrifice through nearly twenty years. It is the only one ever perfected, and although based on the same mathematical theory, is yet essentially different in its mechanism from that contemplated by Mr. Babbage. It was purchased for this observatory in 1856, and was put in operation for a short time in 1858.

"Suppose it is desired to tabulate the series of square numbers beginning with unity. Let us first see how these numbers can be produced by means of successive differences. We arrange them for convenience in the following table:

| Number. | Square. | 1st diff. | 2d diff. | 3d diff. |
|---|---|---|---|---|
| 1 | 1 | | | |
| | | 3 | | |
| 2 | 4 | | 2 | |
| | | 5 | | 0 |
| 3 | 9 | | 2 | |
| | | 7 | | |
| 4 | 16 | | | |

"Now suppose we have three wheels, placed one above the other on a vertical (shaft) axis, on each of which is inscribed zero and the nine digits, corresponding with a like number of divisions on their surfaces. If the number 1 on the upper wheel, 3 on the second wheel, and 2 on the third wheel, be brought opposite a fixed or zero point; and the nature of these wheels be such, that when set in motion by a lever from right to left, the second wheel adds its number to the upper wheel, and by a motion of the lever from left to right, the third wheel adds its number to the second (being in this case constant and always equal to 2); from this arrangement we will be able to compute a table of square numbers.

"We begin by moving the lever from right to left; when 3 (the number on the second wheel) will be added to 1 (the number on the upper wheel), making 4, the square of 2. On moving the lever back, 2 on the third wheel is added to 3 on the second wheel, making 5. Moving our lever back again from right to left, 5 is added to 4 on the upper wheel, making 9 the square of 3. Repeating the process, we next get 7 on the second wheel, which, added to 9 on the upper, makes 16, the square of 4.

"Having given the fundamental principles on which the machine is constructed, we will add a few particulars. This machine can be used to 15 places of figures, of which 8 places are printed, at the time of making the computation. Thirty seconds is the time necessary for a complete result.

"Before starting the machine for any computation, it is necessary to set the proper wheels, after which it needs no further attention; for so long as the last order of differences is constant, it will continue to produce the required numbers. Thus for producing a table of squares, it is only necessary to give the machine three numbers, 1, 3 and 2; and from these data we can compute the squares of all numbers up to 30 millions. In the same manner, by giving the machine the numbers 1, 7, 6, 6, we can produce a table of cubes, the limit being 15 figures. The same principles apply in the computation of logarithms, or any series of numbers whatever.

"We propose to apply motive power to the machine, so that when once set it shall be a complete automaton, making its computations without the assistance of any person. As soon as one set of constants are exhausted, the machine will stop, and will also be made to give notice of the fact by ringing a bell; upon which, a new set of constants may be introduced, and the computations continued."

### IRON-CLADS.

The greatest objection that the opponents of the monitor system offer is, that they are not sea-worthy. We do not ignore the fact that many doubt their powers of offense and consider them failures so far as general efficiency is concerned. We have no disposition to enter upon the discussion of these points anew, as they have all been considered in previous volumes of the Scientific American. Without giving offense we trust that by directing attention to the performances of English built iron-clads, and the opinions entertained in that country by eminent naval officers, engineers, and sailors, respecting their fitness, we shall do some service. We have no hope or intention of silencing cavilers, but, since England is the only nation worthy of notice, now building armored vessels, it will be interesting to see what the skill of her engineers and ship-builders has been able to produce. A Mr. Samuda, an experienced engineer, or constructor of marine engines, recently read a report at the Institution of Civil Engineers, on iron-plated ships, which was so outspoken and plain that it seems but few of the English journals cared or dared to publish it. The report credits Mr. Samuda with saying:—

"The following broad principles must always be kept in view as indispensable conditions:—

1. That these vessels should be constructed of such dimensions and of such power, and be built on such lines, as to command a superiority in speed over the best wooden frigates afloat.

2. That they should be protected by armor over the entire length of their top sides.

3. That the armor should be so constructed as to admit of rapid replacement, or of repair.

4. That the armor should enter into the construction of the ship, and that it should be made use of, for the purpose of giving strength to the whole fabric, to carry its weight and bear its strain, as well as to protect the vessel from the fire of an enemy.

"The *Warrior* class, of 6,000 tuns, has obtained the speed, but has failed altogether in the other three conditions. The *Defense* class, of 3,700 tuns, has failed in all the conditions. The *Valiant* class, of 4,000 tuns, has partially approached the second condition, but fails, or will be found to fail, in the three others. The three new ships, of 6,700 tuns, just commenced, if constructed as at present proposed, will probably possess the first and second conditions, but will fail as to the third and fourth.

"It is now nearly three years since the *Warrior* was commenced. The design, the mode of construction, and the specification for that vessel issued from the Admiralty. It is true that she is not deficient in strength, but without exception her construction is the most complicated and costly that was ever put together. . . . .

"Instead of determining the governing principles, being guided by them, and at the same time encouraging all reasonable improvements in the details, the course followed by those in authority has had the effect of dealing with this important subject on the narrowest basis, and apparently on the assumption that it was an absolute necessity that the armor plates be hung against the top sides of the vessel, which should be as like as possible to those of an old wooden ship. In point of fact, the matter has been dealt with as if it was not capable of improvement, or that it was not desirable to seek for it.

"Many evils have naturally resulted from this ill-advised course. By accepting as a necessity that the great weight of the armor was to be hung on, and the strain to be borne by the top sides, the side of the vessel has had to be increased beyond what would otherwise have been sufficient for the armament to be carried and the speed to be attained; and, further, the armor has been limited to the midship portion only, in vessels of less than 6,700 tuns burthen. This is the practical result of the treatment of the question by the Admiralty authorities. They have, by their acts, said to the country 'If you want a first-class frigate, wholly protected with armor, you must have one of the enormous size and expense of a vessel of 6,700 tuns.' And, adhering to this view, they have accordingly contracted for three such vessels at a cost, with engines, of about £400,000 each. This last conclusion has been arrived at after no less than three classes of iron frigates, partially protected only—namely, the *Warrior*, the *Defense*, and the *Valiant*—have been designed, or built. They appear to have become somewhat startled at the expense of a fleet of such frigates as the *Warrior* and the *Black Prince;* but, instead of seeking a remedy in an improved mode of constructing the vessels, they built four more of decreased size, and these have failed altogether as regards speed, which was the only recommendation the *Warrior* possessed to compensate for partial protection."

An admiral—Sir George Sartorius then said:—

"The vessel which had been built of 6,000 tuns burthen carried only 36 protected guns. That was a most insufficient proportion of artillery to the tunnage. A vessel of the dimensions of the *Warrior*, required much too large a space to turn in, and much too great a depth of water to float in, to get sufficiently near when attacking a battery. While, on the other hand, from the deficiency of her qualities as a sailing-vessel, if she were within range of a battery, and her screw were disabled, she would never be able to get away, or to escape shipwreck, if on a lee-shore in a gale. The *Warrior* only carried five days' or six days' fuel, and, except in the finest weather, and under the most favorable circumstances, she could neither tack nor wear, and even then she required nineteen minutes of time, and two miles, or two and a half miles of space, to perform the latter maneuvre. Moreover, she steered badly, and when she took a sheer, no action of the helm could stop her. She was very leewardly, and rolled more than any ordinary line-of-battle ship. Although expressly built of sufficient strength to sink an opponent by concussion, a useless cut-water was added, which neutralized her power as a ram, and if she attempted to run down a vessel, her bowsprit and cut-water would be carried away, and probably her foremast would follow; so that, if she succeeded in sinking her enemy, she would, owing to the entanglement of the wreck of the two vessels, probably share the same fate herself; and, at the least, her screw would become fouled and useless. It had been asserted that, when an occasion arose, the carpenter's crew could soon knock away the cut-water, and render the vessel available as a ram; but let that alternative be fairly examined. It meant that ten men, or twelve men were to remove a mass of, at least, twenty tuns weight, which was partly secured under water; and let it be remembered, that this operation would probably have to be performed when a ship was going into action, and possibly while she was under fire. In a dry dock it would take at least a couple of days, even if as many men were employed as could muster round the work; and when effected, owing to the shape of the cut-water, it was very questionable if the bowsprit, and consequently the foremast, could be properly secured. Against batteries, even if under perfect command as regarded taking up or leaving her position, such a vessel would prove a failure. Of what use could twelve guns or thirteen guns be, when opposed even to a moderately strong battery, which would be armed with at least twice that number of equally heavy guns? Then, again, as the least motion of the vessel deranged the aim of the gunners, and rendered her fire uncertain, it could only be effective, even in comparatively smooth water, at a distance of 300 yards, or 400 yards. Such being the facts of the case, how could a vessel drawing as much water as the *Warrior* approach near enough to a battery to act efficiently against it?"

A Mr. Bidder, said:—

. . . "The *Warrior* was a complete failure, except in one respect—that she was a fast vessel. It was admitted that she did not steer, but that defect might be remedied. The principal defect was, however, that notwithstanding her great length—400 feet—she had only about twenty-four protected guns, while a length of 100 feet at each end was left unprotected; an enemy in close action would undoubtedly assail those weak points. Her spar-deck was also entirely unprotected. It was impossible to combine in one vessel all the qualities essential for general service, unless she was built of such a size as would render her practically useless, except on such occasion which she might never be called upon to fulfill. Speed could not be combined with the necessary stowage for her crew and for coal."

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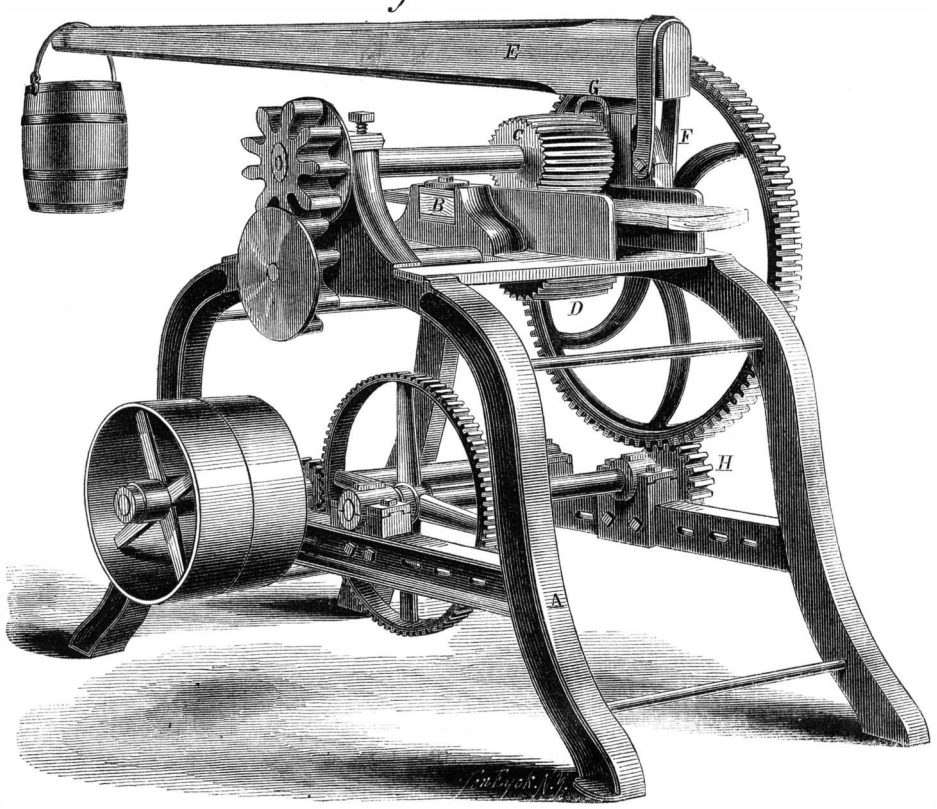
### Stave-dressing Machine.

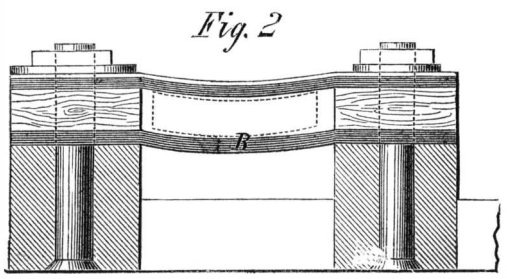
The machine illustrated herewith is intended for dressing staves for barrels, and it is stated by the inventor that he can dress 5,000 of them in ten hours with it. Many of these stave-dressers have been sold and are giving great satisfaction. The machine is simply constructed, is made entirely of iron, and does its work well and rapidly. In Fig. 1 the machine is shown in perspective, and consists of a stout iron frame, A, upon which the details are mounted. The cutters or knives, B, are shown in section in Fig. 2, and one end of them appears in the perspective. There are also two feed rolls, C and D; the upper one of the set is fitted in a peculiarly-shaped bearing, so that the inequalities of the stave, in passing between the knives, will cause the bearing to give and not bend the shaft. The long lever, E, is attached to a stirrup-iron, F, and has its fulcrum on an iron strap, G. The weight at the further extremity is graduated to the resistance required of the knives, or is sufficient to keep the rolls always in contact with the stave, and force it through the cutters. The stave cannot bind or join between the knives as the passage increases at the back, and the rolls are so close that the staves can move laterally to accommodate the grain of the wood. This is quite an advantage if the stave is winding or crooked, as they often are. The gearing, H, below, drives the whole machine. This stave-dresser will turn out a good quality of work without spoiling any, and is sold for $150. It was patented on the 19th of April, 1864, by Jason Palmiter, of Jamestown, N. Y., through the Scientific American Patent Agency. For further information address the patentee as above.

*Fig. 1*




PALMITER'S STAVE-DRESSING MACHINE.

*Fig. 2*




### HYBERNATING FISH.

On the first of this month, Mr. P. T. Barnum invited a number of gentlemen to his museum in this city to witness the release of a living fish from a lump of hard, dry clay in which it had been entombed for several months. The lump was broken open, and the fish was placed in a tank of water, when it immediately began to swim about.

The animal was about a foot in length, and looked like a four-legged eel. On close examination, however, the legs were found to be more like elongated fins than like the limbs of quadrupeds. The fish is known to naturalists as the *Lepidosiren-annectans*, and is found in the dried bed of the river Gambia, in Africa. It is interesting as forming the connecting link between fish and amphibian reptiles.

There are two classes of reptiles. One class includes lizards, snakes and turtles, which breathe by means of lungs through the whole of their lives, the same as birds and quadrupeds. The other class embraces frogs and salamanders, which breathe through gills like fishes while young, and afterwards undergo a change of form; when they are provided with lungs so that they can breathe the air during the remainder of their existence. There is, however, a class of amphibians which retain their gills or branchia through their lives, and hence they are called perennibranchiate amphibians.

The *Lepidosiren-annectans* has gills similar to those of the perennibranchiate amphibians, and it is also supplied with lungs, so that it can breathe either the air or the water, being therefore a *perfect* amphibian; and filling the short division between the amphibian reptiles and the true fishes.

The river Gambia, in which these fishes are found, has water running in it only three months in the year, being dry during the other nine months. When the water disappears these fish descend about sixteen inches into the mud, wrap themselves in a mantle of leaves, prepare a hole up to the surface of the mud through which they can breathe, double themselves in a fold with the tail to the head, and enter upon their nine-months' sleep. The natives of that country are accustomed to dig them up with sharp sticks and eat them.

A number of these reptile-fish were sent to London for sale, and Mr. Barnum's agent had the good luck to purchase twelve of them for $150. Of the twelve, three are yet living. We can certify that the story is no humbug, as we saw one of them taken alive from his argillaceous sarcophagus.

### A National American Herbarium.

Two years since, Prof. Asa Gray made the munificent offer to the University of Cambridge, Massachusetts, of his valuable herbarium and library, upon condition that a suitable fire-proof building should be erected for their reception, and a fund invested for their adequate maintenance. The subject has been in abeyance until recently, when a banker of Boston liberally offered to defray the cost of the required building, provided others raised a fund to meet the current expenses of the establishment. We rejoice to find that this truly national collection, of the greatest importance to American botany, is in a fair way of being disposed of in accordance with Dr. Gray's views. We understand, moreover, that this herbarium is likely to prove a nucleus around which other collections of much importance will probably accumulate.

We sincerely hope that, through the well-known liberality of American citizens, this herbarium and library may be put upon such a footing that Prof. Gray may be so far relieved of its management as to be able to devote himself to the object which we know to be very near his heart—the completion of a Flora of the North American continent. For this great work Prof. Gray has accumulated a very large amount of material; and no botanist is more thoroughly qualified in every way to carry out such an undertaking.—*Natural History Review, London.*

### SOME NEW FACTS IN RELATION TO THE SUNBEAM.

The boundless extent of physical science is forcibly illustrated in the study of the sunbeam. What could seem more simple at first sight than a ray of light? And yet it would require long study to learn all that has been ascertained in relation to it.

First was Newton's discovery that the white ray might be split into seven brilliant and beautiful colors. Then it was found that the ray was a compound of three elements, light, heat and the actinic rays—those which produce the changes in the photograph, and effect all other chemical actions of the sunbeam. Finally, within these few years has come the great discovery that the light produced by burning different substances is not only different in appearance, but, when spectra are formed by passing these different kinds of light through a triangular prism, the spectrum of each element is crossed by lines peculiar to itself. Consequently, however far light may travel, it bears in its constitution the evidence of its origin, and thus brings to us from the sun and from the stars a knowledge of the substances which are glowing in those distant bodies.

Each of the three elements of the sunbeam, light, heat and the actinic rays, has been subjected to a great number of minute and delicate observations, and many curious facts have been learned in relation to each. Among other things, it has been found that some substances which allow light to pass freely through them are almost wholly impervious to heat.

Professor W. A. Miller, the author of the great work on chemistry which we noticed in a late number, has recently been engaged in ascertaining a similar series of facts in relation to the actinic rays. He finds that the same law applies to these; bodies which possess an equal power of transmitting the luminous rays vary very much in their power of transmitting the chemical rays. This is an important fact in photography, as it is desirable to have the lenses of photographic cameras constructed of substances that will transmit a large proportion of the actinic rays.

Of all the substances examined by Professor Miller none was found to surpass rock crystal in diactinic power. Water, ice and white fluor-spar rival it, and pure rock-salt approaches it very closely. None of the different varieties of glass transmit rays extending beyond one-fifth or one-sixth the range afforded by quartz. A plate of glass less than 1-100th of an inch in thickness cuts off these rays almost as completely as a plate of twenty times the thickness. The vapor of water transmits the actinic rays freely although it is extremely impervious to those of heat. Of the liquids examined, water is most diactinic, and next in order alcohol.

STONE SHELLS.—An officer at Bermuda Hundred says the rebels are using shells made of stone, in conical form. Some are a foot long, with a hole which contains the fuse and combustible material, the same as in any shell. The advantages claimed for these shells are that they fly into more fragments and are cheaper, but they are less reliable for accuracy. The stone is a kind of quartz.

THE Amoskeag Company of Manchester, N. H., has built more than one hundred steam fire-engines, including two for London and one for Russia.

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THE

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NEW YORK, SATURDAY, JULY 16, 1864.

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## FACTITIOUS DIAMONDS.

The popular taste runs in grooves or channels sometimes, and fixes itself upon objects as diverse in character and nature as it is possible for any two things to be. In one period, not very long ago, Europeans ran mad upon tulips; at another, respectable old housekeepers prided themselves upon rare china; mahogany has had its day, and still later postage stamps, "shin-plasters," coins, and meerschaum pipes, have in turn occupied public curiosity for a brief hour. Just now all these one-time favorites are deposed, and the diamond has obtained such a hold upon the purses and thoughts of a large portion of the public that lesser objects have no chance. It is not strange that such should be the case, for a real colorless diamond of large size is such a magnificent object that the eye never tires of gazing upon it.

"All is not gold that glitters," neither is every white and sparkling stone a diamond, as too many have found to their cost. Yet these precious stones are now apparently as common as garnets or carnelians. They may be seen sparkling upon the unwashed fingers of some sturdy Bridget, or blazing upon the breast of Patrick, attired for a holiday stroll. The shop boys and girls have them, and it seems almost as if some benevolent society had been formed for the purpose of "supplying every man with his own diamond."

Let not the reader with exclusive tastes, who is, perhaps, the possessor of a genuine stone, mourn over this parade. In the days when his jewel shall gleam untarnished and with renewed splendor, Patrick's shall fade away into a dull gleam. The spirit of his "stone" shall depart, and humbled, robbed of its glitter, the light plucked out, and the flame with which it once glowed quenched forever, it shall be cast aside as useless, and be without its place among men.

"Gew-gaws" correctly express the value which attaches to these paste imitations of the precious diamond—a stone which is the first among jewels, which has never been deposed, and it is safe to say never will be, whose fire rages within, and increases until the eye is dazzled almost beyond endurance; whose gleam is hard, cold, and unsubdued. It fairly revels in its vicious glitter and seems to send out rays that pierce like the arrows shot from Diana's bow. Old as it is, its value is always great, and at the present time beyond the reach of persons of ordinary means. It is in some countries a standard of value, like gold, and it is said that persons here are now purchasing them as investments which cannot depreciate or lose, except in the interest.

The paste imitations of the diamond are known by different titles; sometimes as the "California diamond," "Australian pebble diamond," etc.; but the basis of all of them is quartz or rock-crystal, pulverized and fused in combination with the oxides of certain metals. The paste is technically known as *strass*, after the discoverer, Strass, of Strasburgh, who, by a series of experiments in the 17th century, was very successful in making imitations of precious stones. "Strass is composed of silex, potash, borax, red lead, and sometimes arsenic, in the following proportions:—300 parts silex (quartz, flint, or pure sand); 96 parts of potash; 27 parts of borax (prepared from the boracic acid); 514 parts of white lead; 1 part of arsenic. This mixture is put into a covered Hessian crucible and kept at a great heat in a pottery furnace for twenty-four hours. The longer the mass is kept fluid the clearer it will be when turned out."

Strass of this kind is used for imitating the diamond, rock crystal, and white topaz. There are many signs, however, by which this strass, or Californian diamond, can be detected by the experienced eye. These signs are its inferior specific gravity, its want of hardness, and the absence of coldness to the tongue-test, or when it is applied to that organ. Good strass is so hard that fire flies when it is rubbed on a file, but it is readily attacked by fine quartz-sand on a grinding plate. The small air-bubbles in the strass may be readily detected with a good magnifying glass, and the breath remains much longer upon it on account of its bad conducting power, than upon real gems.

The electrical power of jewels is also another test, for it is stated that genuine stones retain their electricity from six to thirty hours, whereas the false stones retain it scarcely as many minutes. The appearance of some "California diamonds" will deceive many persons, for they have a luster and evanescent fire which is extremely beautiful. This is soon lost, however, by wearing; perspiration, moisture and dirt, washing the hands, etc., soon destroy the appearance of this paste, and in a few days it becomes as dull and lack-lusterless as the eyes of a dead fish.

## MEDDLING LEGISLATION.

On another page will be found some remarks of Professor Simonds of the Royal Veterinary College, England, on the passage of an Act of Parliament to prevent the spread of pleuro-pneumonia among cattle, and it will be seen that in his opinion the passage of the law would fail to prevent the spread of the disease.

As a general rule, the more intelligent people are, the less faith they have in the power of laws to do them good. In ignorant communities nothing is more common than for the people to look to Government for some act of legislation for the cure of every evil and the bestowal of every blessing. But the most common lesson of experience is, that restrictive laws fail to effect the good that was expected of them, while they produce a great deal of evil that was not anticipated. By innumerable experiments the world is being taught the beneficence of freedom, and the injurious operation of restraining and meddlesome laws.

The bearing of these experiments is first perceived by the most intelligent portions of each community. There is probably no people in the civilized world more prone to lean on Government than the French. In France, the finger of the administration is seen in every department of life, and dependence on Government for guidance in every action has become the second nature of the people. But even in France there is one class opposed to all of this looking to Government for interference with the freedom of action, and that class is the most intelligent in the nation; it is composed of the members of the French Academy.

The value of unrestrained freedom, and the evil effects of meddling legislation, are nowhere better understood than among the most intelligent portion of the English people. When Fairbairn established the "Manchester Association for the Prevention of Boiler Explosions," he made no application for the powers of Government to carry out his plans, but trusted wholly to the voluntary assent of all parties who were to be affected by his measures. The beneficent results of the labors of that Association are certainly a triumphant vindication of the principles on which it was founded.

## THE PHILOSOPHY OF BLOWING OUT A CANDLE.

If we blow a fire it burns more fiercely, but if we blow a candle it goes out. These two facts taken together are a familiar illustration of the influence of temperature upon chemical affinity. In both cases, that of the fire and that of the candle, the burning is the combining of carbon and hydrogen with oxygen. Now cold carbon or hydrogen may lie in contact with oxygen for any length of time without combining with either, but if the substances are made red-hot they instantly enter into chemical combination. When a candle is burning, the heat generated by the combustion constantly raises new quantities of the material to the temperature at which combination with oxygen will take place, and thus the combustion is kept up. But if a current of air of a temperature far below the combustion point is thrown against the flame, the hot vapors are swept away, and others which are rising in their place are so cooled that combination with oxygen no longer continues; in other words, the candle ceases to burn.

On the other hand, when we blow a large fire, the mass of burning combustible is so great, that instead of the carbon and hydrogen being cooled, the oxygen is heated, and the combination is made more active; in other words, the fire burns more fiercely.

## TO PREVENT SICKNESS IN THE ARMY.

This short article may save the lives of a thousand men. The valley of the James is a malarious region. North of the tropics the three months in which malaria is contracted are August, September and October. Of all the facts in the science of medicine the one best established is that Peruvian bark is a preventive of malarious disease. Three years ago the surgeons of some of the regiments in the Army of the Potomac administered Peruvian bark, or its extract, quinine, to all of the soldiers in their regiments every day during the three sickly months, and the published statistics showed a remarkable exemption from disease in those regiments. Let every person who has a friend in the army send him a dollar's worth of quinine, with instructions to put as much as will lie on the point of a pen-knife in his coffee every morning, and the probability is that he will escape chronic diarrhoea, fever and ague, and bilious fever.

## ANOTHER GREAT DISPLAY OF FALLING STARS EXPECTED.

The writer of this was among the fortunate few who witnessed the wonderful shower of meteors in the night of Nov. 13, 1833. Being at a large boarding-school, it chanced that some one of the boys caught sight of the fiery rain, and he aroused the whole school. For an hour or two we sat watching the sublime spectacle with mingled interest and awe. The sky was constantly lighted with hundreds of stars, shooting forth from the neighborhood of the zenith, and streaming across the heavens; each leaving a bright streak in its track that gradually faded away.

This most impressive of all celestial phenomena has been the subject of much inquiry among astronomers. It is found that in November of every year the number of falling stars is more numerous than at other periods, and that there is a less considerable display in August. The July number of *Silliman's Journal* contains the last of a series of articles by H. A. Newton on the "November Star-shower." In these articles Prof. Newton has traced the history of this startling phenomenon from the first record of its appearance in A.D., 902, and has discussed at length its most probable cause. He comes to the conclusion that there is a ring of small planets revolving around the sun; that the planets are distributed very unevenly in the ring, there being a small section of the ring where the bodies are numerous with a few stragglers scattered along the rest of its circuit; that the earth passes through the ring every year, and each year in a new place; and that it passes through that part of the ring in which the planets are most numerous once in about thirty-three years. He further concludes that the period of the revolution of

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this ring of planets around the sun may be calculated with very great accuracy, and that it is 354·621 days —a little less than a year. The motion is retrograde, and the velocity with which the bodies enter our atmosphere is 20·17 miles per second. The following are Prof. Newton's remarks in regard to the next appearance of the great shower:—

"If then, a shower occurs in A.D. 1864 (31 years after 1833), it seems most reasonable to look for its greatest display (on the morning of Nov. 14th) 144° west of our Atlantic States, that is, in the western part of the Pacific Ocean and in Australia. In 1865, it may be looked for as central 97° further west, or in western Asia and eastern Europe; and in 1866, on the western Atlantic. The year in which we have most reason to expect a shower, is 1866, since the cycle of 33·25 years is probably to be reckoned from some date between November in 1832 and in 1833. These places and times are named with hesitation—rather to guide observation, than as predictions. The causes alluded to above, and the possible perturbations and irregularities of structure of the group, may cause unexpected variations of time and place."

## THE "KEARSARGE" AND THE "ALABAMA."

To most of our readers the destruction of the *Alabama* will be no news; but it will be gratifying to all of them, as it is to us, to feel that our commerce is safe for a time, and the ocean is free from rebel pirates. We say *for a time*, because it is rumored, nay asserted openly, that another ship is nearly ready for the pirate Semmes to go forth again upon his errands of mischief.

In the accounts transmitted from England to this country, and published in the daily press here, it cannot have escaped the notice of the most indifferent reader that the English are extremely chagrined at this defeat of the man they have feted and honored on all possible occasions. And not this alone, but because the *Alabama* was naturally and nationally identified with their feelings by having been built in England, fitted with engines there, manned by their sailors, and armed with their guns. The *Alabama* was an English vessel, and as such we could not expect other than the most glowing accounts of rebel heroism, and the pluck they evinced under disadvantageous circumstances. The facts are that our eleven-inch shells proved too much for the wooden sides of the *Alabama*, while the Blakely thirty-two pound rifles did no mischief to speak of.

The *Alabama* carried a 100-pound rifle, one 68-pounder and six broadside 32 pounders. The *Kearsarge* carries four broadside 32-pounders, two 11-inch and one 28-pound rifle—one gun less than the *Alabama*.

Not the least remarkable feature in this extraordinary contest is the statements of Semmes himself. He says in one place that the *Kearsarge* fired on his ship when the white flag had been displayed, but afterwards declares that his men stood by and served their guns until they were nearly under water; with touching magnanimity he concludes that the firing on the white flag was "accidental." In his report, too, he tries to fawn upon the English by saying that his best artillerists were those received from, and trained on board, her Majesty's ship *Excellent;* and as we know that the *Kearsarge* was virtually uninjured, and the reports all agree in saying that the *Alabama* fired wild and high, it is rather puzzling to find out where the "valuable services" of her Majesty's gunners came in play. No doubt their will was good enough but their skill is not so apparent. That the English crew on board of the rebel vessel behaved with courage is undeniable; but it is disgraceful to them that they should have fought in support of such a cause, and fortunate that they escaped with life. The brave commander of the *Kearsarge*, Capt. Winslow, deserves great praise for his skill, and we doubt not but that the mercantile community will display their gratitude in some marked manner when the proper time arrives.

THE Washington post-office recently sent four hundred thousand letters from soldiers, principally from the Army of the Potomac. They weighed six tuns. Such patriotism and affection as they may be presumed to contain is not light.

## RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

*Steam Boiler.*—A leading feature of this improvement consists in having a series of water tubes arranged to hang down from the crown sheet into the fire chamber. These tubes are sealed at their lower ends. The fire acts upon them with great energy, and as they are filled with water the production of steam is very rapidly effected. There are some other improvements in the flues connected with the invention. The patentee is a practical boiler-maker, we regard the improvement as a good one. Hugh Leslie, of Jersey City, N. J., is the inventor of this improvement.

*Grading Machine.*—This invention relates to a new and improved machine for grading or scraping roads, and it consists in constructing and arranging the parts in such a manner that a greater or less pressure may be brought to bear on the scrapers, as circumstances may require, and the scrapers also be capable of being adjusted, when not desired for use, out of a working position, so that the machine may be readily drawn from place to place. One of the scrapers being also so constructed that it may be adjusted to work over sloping or inclined ground. Edward H. More, of Moresville, N. Y., is the inventor of this improvement.

*Operating Water-wheel Gate.*—This invention consists in the employment or use of a supplemental hopper placed within the ordinary hopper of a pair of mill stones and connected by means of levers and a rock-shaft to the gate of a water-wheel, or to the idle or friction pulley of a driving belt, in such a manner that when the hopper becomes empty the gate of the water-wheel will automatically close, or the driving belt be slackened so as to stop the mill. Joseph Hough, of Westchester, Pa., is the inventor of this improvement.

*Mold for Hemispheres.*—The object of this invention is a mold particularly intended for the manufacture of school globes out of paper pulp or other suitable plastic material or materials. The invention consists in a mold composed of two parts, one male and the other female, which are fitted together by means of flanges, perforated, if necessary, to let the water escape, and held together by movable rings and adjustable spring fastenings, in combination with a channel leading to the interior of the female mold and with a plunger or follower in such a manner that by the action of said follower the material, from which the globes or hemispheres are to be made, can be compressed to any desired degree, or until the spring fastenings give way and allow the two parts of the mold to separate. John R. Agnew, of Lancaster, Pa., is the inventor of this improvement.

## Vinegar and Olive Oil.

A great part of the vinegar consumed in Paris is produced by the distillation of vine-stalks. It is much stronger than vinegar produced from the distillation of wine, and it is consequently reduced by the addition of water previous to being offered for sale. The neighborhood of Orleans produces the greatest quantity of white wine vinegar sold in Paris. A great proportion of what is sold for olive oil is either poppy oil or beech oil flavored with olive oil. Unadulterated olive oil, which is scarce and dear in Paris, comes from Provence (where the production is constantly diminishing), from Genoa, and the island of Candia. Algeria now supplies a large quantity of olive oil. Rape oil is produced chiefly in the departments of the Nord, the Pas de Calais, and Calvados, where the cultivation of the plant is a great source of wealth. It is used for the lamp, for painting, and in various manufactures. Fish oil, brought to France by the boats engaged in the northern fishery, is chiefly employed in dressing leather.

A ROSE tree, now in Glencove, Long Island, is described as decorated with some 9,500 buds and roses, hanging in bunches of twenty to thirty each. It is one of the family of "*Rosa Rubifoli;*" its standard or trunk stands six feet in hight, measuring five inches in diameter: the branches form an umbrella-shaped arch, and measure twelve and a half feet in diameter, or thirty-six feet around.

## Repairing the Silvering of Looking-glasses.

The repairing of the silvering on the backs of looking-glasses has hitherto been considered a very difficult operation. A new and very simple method, however, has been described before the Polytechnic Society of Leipsic. It is as follows:—Clean the bare portion of the glass by rubbing it gently with fine cotton, taking care to remove any trace of dust and grease. If this cleaning be not done very carefully, defects will appear around the place repaired. With the point of your knife cut upon the back of another looking-glass around a portion of the silvering of the required form, but a little larger. Upon it place a small drop of mercury; a drop the size of a pin's head will be sufficient for a surface equal to the size of the nail.. The mercury spreads immediately, penetrates the amalgam to where it was cut off with the knife, and the required piece may now be lifted and removed to the place to be repaired. This is the most difficult part of the operation. Then press lightly the renewed portion with cotton; it hardens almost immediately, and the glass presents the same appearance as a new one.

## MISCELLANEOUS SUMMARY.

ARTIFICIAL IVORY.—The possibility of procuring a substitute for ebony and ivory has become an important question, now these materials command such extravagant prices. M. Ghoulston Ghislain has brought before the French Academy a substance which he asserts answers this purpose completely. He produced it by the following method:—Take 60 per cent of the powder of marine plants, 15 per cent of glue, and an equal quantity of coal tar; boil till thoroughly mixed; dry in an oven at a temperature of 300° Fah. till it becomes plastic. The compound will assume the appearance of ivory by heating it in an aqueous solution of caustic potash, and letting it macerate for several hours in diluted sulphuric acid; after which subject it to the action of chlorine or chloride of lime, repeating the operation till it becomes perfectly white.

EXPERIMENTS ON THE RESPIRATION OE PLANTS, ETC.—At a late meeting of the Munich Academy of Sciences, Baron Liebig presented an interesting paper on certain experiments he had made with an apparatus constructed at the expense of the King of Bavaria for estimating oxygen in various bodies. These experiments prove that not only is oxygen disengaged from the atmosphere by plants, but also, and in considerable quantities, by the decomposition of water in the bodies of carnivorous animals. Baron Liebig is of opinion that this fact will throw new light on the phenomena, at present so little understood, of nutrition and digestion.

CHICAGO OBSERVATORY—An astronomical observatory has been recently commenced at Chicago, through the liberality of some of her citizens, to be connected with the University of Chicago. A large equatorial telescope, now partly finished, has been ordered from Alvan Clarke, of Boston, which is to be 23 feet in length, and 18¾ in aperture. It is to cost, including transportation and mounting, $18,187, and to be finished in June, or some time before the tower is ready for its reception. The tower is to be octagonal in shape, 35 feet in diameter and 100 feet high to the hemispherical top. Another tower, also, is to be erected, for the meridian circle.

WHAT AN INVENTOR DID.—The Brussels carpets of England are woven on looms invented by an American and bought of him. Bigelow, an American, went to England to study carpet-weaving in the English looms, but English jealousy would not allow him the opportunity. He took a piece of carpeting and unravelled it thread by thread, and then combined, calculated and invented the machinery on which the best carpets of Europe and America are woven.

MANY POTATOES FOR ONE.—M. J. Cowell, of Cayuga county, N. Y., has been experimenting upon the yield of potatoes, and succeeded in getting 217 from one potato, the most in twelve experiments; variety not named.

PAPER MACHINERY.—R. Hamilton, Dayton, Ohio, wishes to communicate with parties who make good machinery for the manufacture of wrapping paper from wheat and oat straw.

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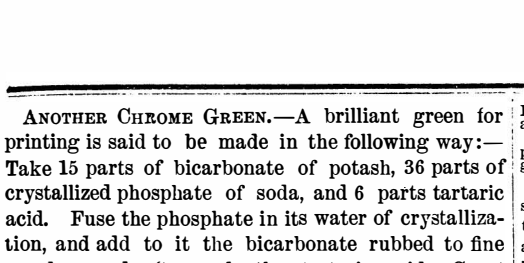
ANOTHER CHROME GREEN.—A brilliant green for printing is said to be made in the following way:—Take 15 parts of bicarbonate of potash, 36 parts of crystallized phosphate of soda, and 6 parts tartaric acid. Fuse the phosphate in its water of crystallization, and add to it the bicarbonate rubbed to fine powder, and afterwards the tartaric acid. Great frothing takes place on the last addition, and the color of the mass changes from yellow to green. A porous brown mass remains, which dissolves in hot water and dilute acids, giving an emerald green solution. The porous mass is to be moistened with as much strong hydrochloric acid as it will absorb; it is then treated with cold water to remove the acid, and afterwards with boiling water to dissolve out the soda and potash salts. An insoluble green body remains on the filter, which, when more finely divided by levigation, becomes of a brighter shade. The 6 parts of tartaric acid may be replaced with 14 parts of Rochelle salt.—*Chemical News.*

MAN FORMERLY ACCOMPANIED BY THE REINDEER IN CENTRAL FRANCE.—Lartet and Christy have found in caves in central France (that of Eyzies and others) a floor-breccia containing bones of the reindeer and other animals, ashes, fragments of charcoal, flint chippings, and weapons and utensils of reindeer bones and horns, with slabs of stone having sometimes the forms of animals scratched upon them. Among the remains of the reindeer, several vertebræ are sometimes found united, and also jointed bones with their parts still in connection, showing that the animals must have lived in the region; and the long bones are usually broken in the same uniform way, and evidently to get the marrow out. The remains of the common stag, wild boar and hare are very rare. A few teeth of the Irish elk are found, and an occasional dental plate of the old elephant is met with. There is no written record of the existence of the reindeer, or of a sub-arctic climate, in what is now temperate Europe.—*Comptes Rendus.*

TIN ORE.—The San Francisco *Mining Press* says: "Mr. Boyd, of Calaveras County, went to Mexico some time since on a prospecting trip, and writes from the interior of the State of Durango that he has discovered an exceedingly rich tin mine in that State. Sixty-nine pounds of ore yielded thirty-three and a half pounds of pure tin."




## ISSUED FROM THE UNITED STATES PATENT-OFFICE
### FOR THE WEEK ENDING JULY 5, 1864.

*Reported Officially for the Scientific American.*

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

**43,379.—Mould for making School Globe.—J. R. Agnew, Lancaster, Pa.:**

I claim, first, The combination of the two parts, A B, of the mould with stationary flanges, d e, and movable flanges, g h, constructed and operating substantially as and for the purpose specified.

Second, The plunger, l, in combination with the screw, m, or its equivalent, and with the two parts, A B, of the mould, constructed and operating as and for the purpose set forth.

Third, The spring fastenings, j j, * in combination with the plunger, l, screw, m, and convex and concave-mould, A B constructed and operating in the manner and for the purpose substantially as herein shown and described.

**43,380.—Adjustable Skirt Former.—James Amos, New York City:**

I claim a former, for use in the manufacture of skirts, so constructed that it can be enlarged or diminished in size substantially on the principle set forth, so that by means of and on the same former skirts of different sizes can be made.

**43,381.—Valve for Steam Engine.—Edward R. Arnold, Providence, R. I.:**

I claim a balanced or nearly balanced, self-adjusting induction way to connect the steam chest with the valve, the area of said induction way being such as to counter-balance the pressure in the ports of the valve and cylinder, substantially as described.

**43,382.—Provision for the recoil of Ordnance.—John B. Atwater, Chicago, Ill.:**

I claim, first, A piston, D, (with or without the head D) adapted to be projected within the bore by the force of the recoil, in any manner substantially as described.

Second, I claim the combination with the piston, D, of the hoop or frame, E, adapted to hold the said piston against recoil, substantially as and for the purpose specified.

Third, I claim the combination of the spring, E, with the piston D, and hoop, E, to gradually arrest the recoil of the gun, substantially as set forth.

Fourth, I claim the combination of the stuffing-box, A2 a, with a piston, D, adapted to be projected within the bore by the recoil of the gun as explained.

[The object of this invention is to apply the recoil of the gun in such a manner as to increase the explosive force of the charge, and to this end the invention consists, essentially in the employment of a piston which is passed through a corresponding gas-tight aperture in the breech, and remains immovable while the gun recoils so as to diminish the capacity of the bore commensurately with the bulk of that portion of the piston which enters the same and thus limit the space within which the gases are allowed to expand.]

**43,383.—Printing Press.—Franklin L. Bailey, Boston, Mass.:**

I claim a rotating reciprocating or sweeping bed, F, whose flat plane surface for the type stands in a plane always obliquely to its center of motion, and obliquely to the arc of a circle which any point on its surface may scribe as the bed moves to and fro on its center or centers of motion so that the lower edge of any form will scribe a smaller circle than any other part of the same.

Second, I claim a vibrating platen which is so arranged that its face swings upwards for the reception of the sheets, upon a hinge near its top edge, also the combination of the same with the bed, F, also the giving the same a downward sliding, or equivalent motion for the purpose specified.

Third, I claim the combination of the platen with its movable support or slide, H, also the combination of the spring, Y, or its equivalent with the slide, H.

Fourth, I claim giving the platen its vibrating movements and periods of rest, by means of the cam groove, or its equivalent, and the moving bed, F.

Fifth, I claim the combination of the platen and a movable support H, or its equivalent with the adjustable support plate, I, for the purpose specified.

Sixth, I claim the combination of the nipper, a′, and its lip, b, with the platen which swings upwards to receive upon it the card to be printed.

Seventh, I claim the arrangement for operating the nipper, a′, with its lip for the purpose of dropping the cards.

Eighth, I claim the combination of two or more sliding ink-distributing tables, moving laterally and going in opposite directions to one another, substantially as described, also the combination with them of the ratchet wheel, m, and forked lever, p, which operate them.

Ninth, I claim combining with the rotating reciprocating bed, an ink-distributing table which moves laterally for the purpose described

**43,384.—Machine for driving Screws.—Alfred M. Bailey, and John O. Couch, Middlefield, Conn.:**

I claim, first, The production of an organized machine or apparatus or tool for driving wood screws arranged and combined to operate as herein de cribed when actuated by a prime mover.

Second, The combination with a suitable frame holding in fixed bearings the screw-driver and with a platform to support the work to be operated upon of a mechanism for elevating the platform to the driver, together with a self-centering screw head cap for holding the driver concentrically with the screw substantially in the manner and for the purpose described.

Third, The method of operating the screw driver by a friction device, substantially as described, the same consisting of a pair of friction pads or clutches upon the tool holder and its surrounding pulley shaft respectively arranged for action in conjunction with the movable platform as described, so that by elevating the platform to the screw driver the pads or clutches will be brought into frictional contact whereby rotary motion may be imparted to the tool or stopped and its speed checked at pleasure

**43,385.—Process of Separating Silver and Gold from Lead.—Edward Beelback, Newark, N. J.:**

I claim, first, Melting the lead which contains the silver and gold in a furnace with an inclined hearth, and drawing it off into a kettle containing, or to contain, a proper quantity of zinc to take up its silver and gold, instead of melting it in the kettle, as and for the purpose herein described and set forth.

Second, Casting the mixture of lead, silver, zinc and gold, after it has been sufficiently stirred for the zinc to take up the silver and gold, into pigs or masses of suitable form and size to re-melt in the furnace.

Third, Placing these pigs or blocks of lead, zinc, silver and gold, in a furnace with an inclined hearth, and then subjecting them to a low degree of heat, sufficient to cause the lead to melt and run off, but not sufficient to melt zinc, silver and gold.

**43,386.—Rest for turning Lathes.—William H. Barney, Columbus, Ohio:**

I claim, first, A back rest for turning lathes so constructed that the operator can adjust and set the same in the desired position by the manipulation of a single lever operating substantially as described.

Second, The combination of the vibrating support, D, cam lever, E g, guide-piece, G, and adjusting bolts, b, substantially in the manner and for the purpose described.

Third, The combination of the vibrating arm, D, and vibrating lever, E, with the reciprocating support, A, substantially as described.

**43,387.—Pump Gear.—Henry and Frederick J. L. Blandy, Zanesville, Ohio:**

We claim the employment in combination with a counter-shaft, B, for driving the feed pump of an engine, of a friction wheel E, on the main-shaft of the engine, a friction wheel, F, on the said counter-shaft, and an intermediate idle friction wheel, G, suspended from a lever or its equivalent, substantially as herein specified.

[This invention consists in transmitting the motion from the crank shaft of a steam engine to a counter-shaft for working the feed pump by means of a system of friction wheels, one of which is arranged as an idle wheel to be thrown in and out of gear as required to connect the pump with and disconnect it from the engine, the object being to effect such connection and disconnection in a more easy manner than can be done by the means heretofore used, and to relieve the engine of all avoidable friction and the driving gear of the pump of all avoidable wear when the pump is not in operation.]

**43,388.—Attaching Horses to Carriages.—Leander W. Boynton, Hartford, Conn.:**

I claim the draft harness, in combination with the metallic tubes, springs, bolts, and graduated scales, when the whole is constructed, arranged, and fitted for use, substantially as herein described and set forth.

Second, I claim the above, in combination with the breech strap, C, and its shifting collars, q, for adjusting the height of the breech strap) when the whole is constructed and fitted for use, substantially as herein described.

**43,389.—Attaching Keys to Melodeons, &c.—A. G. Burton, Shelburne Falls, Mass.:**

I claim uniting keys to melodeons to the key-board by means of springs, substantially as, and for the purpose set forth.

**43,390.—Grain Separator.—J. N. Clees, Darbyville, Ohio:**

I claim the rotating screen, B, composed of a fine and of a coarse portion, a b, the spiral conveyer E, and blast spout F, all arranged and combined to operate in the manner substantially as and for the purpose herein set forth.

[This invention relates to a new and improved grain separator designed chiefly to be applied to thrashing machines, and to operate conjointly therewith so that the grain may be thrashed, and cleansed or separated from all impurities at one and the same operation.]

**43,391.—Pencil.—Orestes Cleveland, Jersey City, N. J.:**

I claim a pencil constructed with the parts glued together with dovetailed joints, substantially as described.

**43,392.—Excavator.—Daniel Close, Hammonsburgh, Pa.:**

I claim the dirt-box, M M, with the valves in bottom, N O, constructed as described in combination with the plows, F, and elevators A. The whole when combined for the purpose set forth and constructed as described.

**43,393.—Detergent.—Samuel Coburn, Stamford, Conn. Ante-dated June 23, 1864:**

I claim a combination for the purpose aforesaid, of soda with ammonia and chlorine by the means and in the manner substantially above stated.

**43,394.—Weather-strip.—Giles H. Collins, Wayne, Mich.:**

I claim, first, The sliding-bar, E, having the spring-catch, G, projecting therefrom, when combined with a door, and operating with reference to a weather strip, A, and its attachments, substantially in the manner herein set forth.

Second, I also claim the swinging-lever, D, when operating in combination with the tumbler, F, sliding-bar, E, and spring-catch, G, in the manner herein set forth.

**43,395.—Cultivator.—John Davis, Alleghany, Pa.:**

I claim the arrangement of the pieces, e and e′, uprights, f and f′ and bars, g, with teeth, h, the whole being constructed, arranged and operating substantially in the manner herein described and for the purpose set forth.

**43,396.—Animal-trap.—Elliott H. Crane, Janesville, Mich.:**

I claim the combination of the horizontal revolving door, B, vertical shaft, C, crank, E, spring, D, stop, F, external trigger, G, bait-hook, H, and guard-plates, e e, all being arranged to operate in the manner and for the purposes specified.

[This invention relates to a new and improved trap designed for catching game and annoying animals such as rats, mice, etc. The invention consists in the employment or use of a box, which may be of rectangular form, and provided at one end with a door hung on a vertical centre-shaft, the lower end of which is connected to a coil spring, and the upper end provided with a crank, said door being armed with teeth and blades, and used in connection with a stop and trigger-bar, all being so arranged as to form a simple and efficient self-setting trap.]

**43,397.—Lamp Shade-holder.—James Fallons, Philadelphia, Pa.:**

I claim constructing and applying the springs, a1 a2 a3, to the crown, A, so that they shall serve the double purpose of clasping the paper shade adjustably in the said crown, A, and of supporting the whole together upon the chimney of the lamp, substantially in the manner described and set forth, for the purposes specified.

**43,398.—Pocket-knife.—George H. Gardner, Philadelphia, Pa.:**

I claim, as a new article of manufacture, the pocket-knife constructed as herein described.

**43,399.—Car-coupling.—Jas. M. Gow, Rock Island, Ill.:**

I claim the coupling-pin, B, provided with an arm or projection, h, having a pin, i, passing transversely through for the pin to swing upon and describe a short arc under the action of the entering link or shackle, substantially as set forth.

I also claim in combination with the pin, B, thus suspended, the projections, f f, at the lower parts of the sides of the pin, in connection with the curved ledges, g, at each side of the recess, d, to serve as a support for the pin, as set forth.

I also claim the grooves, k k, at each side of the opening, b, and slot, c, in combination with the pins or screws, l l, the projections, f f, of the pin, B, and the recesses, m, in the sides of the slot, c, all arranged substantially as and for the purpose specified.

I further claim the shoulder, n, on the back part of the pin B, when arranged in relation with the back part of the slot, c, for the purpose herein set forth.

[This invention relates to an improvement on a car coupling, for which Letters Patent were granted to this inventor, bearing date Feb. 9th, 1864.]

**43,400.—Paper Collar.—Solomon S. Gray, Boston, Mass.**

I claim, first, Cutting out the paper strips from which the collars are to be made, so as to have the greater expansibility of the paper in the line of the length of the collar when the collar is to be formed by extension of the material in whole or in part, substantially as and for the purpose described.

Second, I also claim flaring the under portion of the collar, to cause it to fit more exactly the shape of the neck of the user or wearer, substantially as described.

**43,401.—Apparatus for forming Collars.—Solomon S. Gray, Boston, Mass.:**

I claim, first, The combination of the former, D, with the elastic band or its equivalent, when operating substantially as herein described.

Second, I also claim holding the strip or collar by its two ends whilst the former is being forced into or through it to mold it to the desired form, substantially as described.

**43,492.—Valve for Steam Engines.—Smith Groom, Troy, N. Y.:**

I claim the recessed or chambered slide-valve of steam engines, together with its respective ports or their equivalents, substantially as herein-before set forth.

**43,403.—Liniment.—Joseph R. Grows, Brunswick, Maine:**

I claim compounding the ingredients named, in the proportions and manner herein described, using for that purpose the aforesaid compounds, which will produce the liniment or composition aforesaid.

**43,404.—Sewing Machine.—Luther Hall, Boston, Mass.:**

I claim, first, Sizing the needle-thread and carrying it around the under spool, S, and spool case, N, by means of the hook, K, constructed and arranged substantially as described.

Second, The spool case holder or bracket, M, with a lateral opening so constructed and arranged that while it retains the spool in place it will receive the distended loop of the needle-thread when seized and presented by the hook, H, to be passed under and around the spool, substantially as described.

Third, The spool case, with its horn, b, constructed substantially as set forth for the purpose specified.

Fourth, The combination and arrangement of the wheel, G, hook, H, rod, I, and lever, J, substantially as set forth and for the purpose of carrying a loop of the needle-thread around a spool of commerce.

Fifth, The combination of the almost stationary spool case for containing the common spool of commerce with the hook or looper, H, substantially as and for the purpose set forth.

Sixth, The combination of the bracket or spool case holder, M, the spool case, N, with its horn, b, and spool, S, substantially as set forth and for the purpose described.

**43,405.—Curry-comb.—Norman C. Harris, Poultney, Vt.:**

I claim elongating and curving or bending out, laterally on both sides, from the original plane, the back edges of the teeth bars, so as to give greater breadth of support thereto upon the back of the curry-comb, substantially as and for the purposes herein specified.

**43,406.—Curing and drying Hay, Grain, etc., in Ricks, Stacks, Mows, or Pens.—Theodore Heermans, Mitchelville, Tenn.:**

I claim "curing" and drying hay, grain, etc., in ricks, stacks, mows, or pens, in the manner and by the means substantially as herein set forth.

**43,407.—Shutter Bolt.—Daniel C. Heller, Reading, Pa.:**

I claim the revolving button, f, with inclined planes, h, in combination with the stationary stud, e, pin, i, and bolt, A, constructed and operating in the manner and for the purpose herein shown and described.

[This invention relates to an improvement in that class of shutter bolts which serves to secure the shutter, when the same is partially open or when it is wholly closed.]

**43,408.—Stitching Clamp.—Nicholas Holden, New York City:**

I claim a clamp for stitching or swing loops upon a loop stitch attached, either stationary or adjustable, as herein-described and for the purpose set forth,

**43,409.—Motive Power Cut-off in Grist Mills.—Joseph Hough, West Chester, Pa.:**

I claim the arrangement of the supplemental hopper, D, levers, E G M, rods, F I N, and rock-shaft, J, in combination with the gate of a water wheel, or with the idle or friction roller of a driving belt, for the purpose of automatically disconnecting the motive power of a grist mill, substantially as specified.

**43,410.—Lever-spring Latch.—J. N. Houston, Decatur, Ind.:**

I claim the combination of the taper-ended hook, C, spring, b, and self-acting elastic retaining catch, D, when the said parts are constructed and arranged in the manner herein specified.

[This invention consists in the application of two spring catches

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combined together in such a manner that one catch or latch serves to fasten or release the shutter, door, or other article, and the second catch retains the first or the latch in position when the same is set to release or unfasten the shutter or door, and if the latch is in this position and the shutter or door is closed, a slight pressure on said catch serves to release the latch and to fasten the door.]

43,411.—Water Gage.—Francis A. Hoyt, Buffalo, N. Y.:

I claim the arrangement of the valve-seat in the upper part of the dry steam chamber, in combination with the operating lever, G, and connecting chain, H, for the purposes and substantially as descrtbed.

43,412.—Breech-loading Ordnance.—William Wheeler Hubbell, Philadelphia, Pa.:

I claim, first, The peculiar combination of the loading hole, n, through the breech cylinder with the metal solid around it with the channel, l, the upper side of the coned faucet breach and the chamber, t, in the barrel, for the purpose of forming a strong, light, and serviceable construction of breech-loading cannon, as described.

Second, Also I claim the automatic vent-stopper or finger, U, operated by the spring, W, and pin, V, as described.

Third, Also I claim enlarging the breech cylinder beyond the barrel, on the lower side of the barrel, and leaving the straight line of sight on the upper part, with loading hole, n, through the metal, to adapt it to the faucet breech for cannon, as described.

43,413.—Condensing Apparatus.—Gustavus P. Jasper, Charlestown, Mass.:

I claim my improved condensing apparatus made as herein-before described, viz: with the close vessel, F, provided with the eductions, G H, or either of them, and combined with the stand pipe, E, and the condenser, A, having the spray pipe and other appliances, substantially as specified.

43,414.—Treating Gum for the Manufacture of Varnish.—John Johnson, Saco, Maine:

I claim, first, The application of a jacket, C, of a good non-conductor for heat to the body and cover of a gum boiler, A, in the manner and for the purpose substantially as herein specified.

Second, The employment or use in combination with a gum boiler, A, of an exhauster, D, substantially such as herein described, or its equivalent, for the purpose set forth.

43,415.—Portable Fence.—Jacob Kennel, Morton, Ill.:

I claim the combination of the posts, a, of separate panels with the brace, f, between them and the connecting bolt, o, when said posts and braces extend and cross above the top rail, forming forks for riders to rest, in the manner described for the purposes set forth.

43,416.—Tobacco Pipe.—Albert Kuhn & Leonard Nax, Philadelphia, Pa.:

We claim the arrangement of the chamber, C, between the bowl, B, and stem, A, in combination with the receptacle, D, and the inclosed stem, c', substantially as described and set forth for the purposes specified.

43,417.—Steam Boiler.—Hugh Leslie, Jersey City, N. J.:

I claim in combination with the fire-chamber, D, the flues, G, to conduct the products of combuscion downward, all substantially as herein shown and described.

I also claim the combination with the short flue tubes, G, of the flue tubes, H, extending through the boiler, substantially in the manner and for the purpose herein shown and described.

43,418.—Manufacture of Sleigh Runners.—Harmon Lovelace, Chatfield, Minn.:

I claim a shoe for sled and sleigh runners, constructed by casting metal around wrought metal rods, in the manner substantially as and for the purpose hercin set forth.

[The object of this invention is to obviate the difficulty of portions of the shoe becoming detached from the runner, in case of the breaking of the former, a contingency of frequent occurrence, and which occasions considerable annoyance and trouble.]

43,419.—Gas Stove.—Samuel T. McDougall, New York City:

I claim a gas stove constructed in a rising series communicating with each other, substantially as described, each supplied with a separate combination cylinder, operating as specified.

43,420.—Baby-jumper and Swing.—S. T. McDougall, New York City:

I claim, first, Constructing baby-jumpers and nursery swings, in the form and composed of the various parts herein described.

Second, I claim the combination of the baby-jumper, the nursery swing, the cradle or bed, and the baby-walker, constructed and arranged substantially as described.

43,421.—Process for printing from Engraved Plates.—Jeremiah Meyer, Bay Ridge, N. Y.:

I claim the within-described process of preparing the surface of paper before printing, by the application of a mixture of chalk or other suitable material, mixed with or without gum-arabic, and washing it after printing, substantially in the manner and for the purpose herein described.

[This invention consists in the application to the paper, before printing, of a very thin stratum of a hydrated solution of chalk or other suitable material, used with or without a small quantity of gum-arabic, and in washing off this stratum after the printing has been accomplished in such a manner that engravings on steel, copper, or composition, can be printed from rollers in the ordinary cylinder machine, instead of printing them from plates or flat surfaces by the ordinary slow process, and that the paper prepared as above stated when exposed to the process of the engraved roller, will readily take the ink, and the film adhering to the elevated or bright portions of the roller and thence deposited on the paper, can be readily washed off with the stratum of chalk or other material covering the surface of the paper, and a clean and perfect impression is the result.]

43,422.—Grading and Road-scraping Machine.—Edward H. More, Moresville, N. Y.:

I claim the two scrapers, D D', connected to the platform, A, substantially as shown in connection with the arms, F F', all arranged substantially as and for the purpose herein set forth.

I further claim the adjustable wing or scraper, D', constructed of two parts, e e', connected by a joint, f, and used with the bar, F, or its equivalent, substantially as and for the purpose specified.

43,423.—Churn.—Robert Murphy. Jasper, N. Y.:

I claim barrel churn, A, rotated upon transverse trunnions, a a, and provided with counterpoises, d* d, the whole being arranged to operate in the manner and for the purpose set forth.

[This invention consists in suspending a barrel-shaped cream receptacle on trunnions in a suitable framing, and having the receptacle cut circumferentially a suitable distance from one end and fitted within a hoop or band, and secured in a tightly closed state by means of hooks and staples. The invention further consists in the application of weights or counterpoises to the receptacle, for the purpose of insuring an uniform or steady rotation of the receptacle.]

43,424.—Paddle Wheel.—Lewis A. Norton, Healdsburg, Cal.:

I claim as my invention and improvements in paddle wheels, a series of radical rotating floats, pivoted as described, in combination with the shackle bar, E, and stationary cams, B B, which operates the shackle-bar and floats, as described.

43,425.—Fire Escape Ladder.—Wm. H. Paige, Springfield, Mass.:

I claim, first, The hinged ladder, N, having its several sections of unequal lengths, when said inequality is graduated as herein described, in combination with reel, I, and other suitable mechanism for operating it.

Second, The construction of the hinged ladder, N, swinging standards, O O O, and chain, p, when arranged and operating substantially as herein described.

Third, The combination of a hinged ladder with a reel, I, and spirally grooved cone, K, operated by chain, v, or its equivalent, substantially in the manner and for the purpose herein set forth.

43,426.—Sewing Machine Shuttle.—Charles Patch, South Reading, Mass.:

I claim as my invention the application of a spring catch, g, within the bobbin recess of a shuttle and with respect to a journal, b, of the said shuttle, and a recess, d, thereof for receiving such journal, and so as to operate with the said journal, substantially in manner and for the purpose herein-before specified.

43,427.—Meat-cutter.—John G. Perry, South Kingston, R. I.:

I claim, first, The combination of the cylinder knife or knives, and the frame or part that holds the knife or knives, substantially as described and for the purposes set forth.

Second, I claim the arrangement of the arm, j, with the platform, r e c, or other equivalent devices, the whole arranged and operating substantially as described.

43,428.—Meat-cutter.—John G. Perry, South Kingston, R. I.:

I claim, first, Making the plate to hold the knives (fig. 3), with recesses, S S, having alternate projections, 1 1 1, and vacancies, e e e, on their sides, substantially as described and for the purposes set forth.

Second, I claim the arrangement of parts substantially, as herein described, for the purpose of holding the machine in place, as herein set forth.

43,429.—Process of treating Petroleum, etc.—Charles S. Potter, Brooklyn, N. Y. Ante-dated June 21, 1864:

I claim the method herein specified of treating coal oil, petroleum, and similar substances, or their products, for their separation and purification, as set forth.

43,430.—Self-lubricating Bolster of Spinning-machines.—Wm. F. Rippon, Providence, R. I.:

I claim, first, The combination and arrangement of the chambers, c c, in the head of a spindle-bolster, for holding an absorbent, with the duct, d, through the axis of the head of the bolster, and the bearing, E, of the spindle, substantially as described for the purposes specified.

Second, The combination of a channel, F, substantially as specified, in the rail with a spindle-bolster, constructed as herein described for the purposes mentioned.

43,431.—Sawing-machine.—W. M. Salmon, Edwardsburgh, Mich.:

I claim the sawing-machine above described, consisting of the pitman, D, slide, E, pivoted bar, F, connecting bar, I, head, G, saw, H, and feeding apparatus, P T S R Q V, all arranged and operating substantially as specified.

43,432.—File-hook.—G. W. Schramm, Brooklyn, N. Y.:

I claim the spring-hook attached to the filing-plate, and operating as and for the purpose herein shown and described.

43,433.—Composition for making barrels water and oil-tight.—Theodore Schumann, New York City, and Christian G. Frash, Brooklyn, N. Y.:

First, We claim the employment or use for the purpose of lining barrels or other vessels, or for coating wooden or other articles, of a composition made of the ingredients herein specified, and mixed together, substantially in the manner set forth.

Second, A lining for barrels or other vessels, or a coating for wooden or other articles, composed of an inner stratum of unchanged glue and an outer stratum of glue which has been render insoluble in water, substantially as and for the purposes described.

Third, The use of soap in combination with glue or gelatine and with either one of the salts herein specified, or with a combination of two or more of the same, as and for the purpose set forth.

43,434.—Cider-mill.—Daniel Scully, Baltimore, Md.:

I claim the combination of the rotating cutting-cylinder, the stationary knives, and the crushing-rollers, arranged and operating substantially in the manner set forth.

43,435.—Paper-fastener.—Addison Smith, Perrysburg, Ohio:

I claim the ornamented metallic plate, B and C, with teeth, D D, on their sides for the purpose of permanently fastening sheets of paper at their corners, edges and centers, substantially as herein described.

43,436.—Wagon-brake.—John Snyder, Centre, Pa.:

I claim the shaft, A, crank-levers, B B, operating in the mortices, c c, with the rubber, I, and lever, F, all constructed and arranged as described.

43,437.—Smoking-pipe.—John Statz, Washington, D.C.:

I claim the construction, arrangement and combination of the double pin, A, cylinder, D, with its plate, E, lid, H, with its spring, G, and double collar, K and M, when arranged and combined as herein described and for the purposes set forth.

43,438.—Fife.—John W. Tanner, New York City:

I claim, as an improved article of manufacture, a fife, made convertible substantially as described and for the purposes set forth.

43,439.—Hair-pin.—Andrew T. Thayer, New York City:

I claim a hair-pin, constructed or formed with a circular spring, b, at the junction of its prongs, a a, substantially as herein set forth.

[The object of this invention is to obtain a hair-pin which will not slip out of the hair, or become casually loosened and detached, and to this end the invention consists in constructing the pin with a circular spring at the bend or junction of the two prongs of the pin, whereby a certain degree of elasticity is obtained sufficient to cause the two prongs, when pressed in contact and inserted into the hair, to press or bear against the same, and be thereby firmly held in position.]

43,440.—Mode of Attaching Car-wheels to Axles.—R. S. Torrey, Bangor, Maine:

I claim the arrangement of the nut, C, key, d, and screw, h, in combination with the shouldered axle, B, for securing the wheels, A A, on said axle, substantially as herein specified.

I also claim the series of key-rockets, g g, on the nut, C, in combination with the key-notch in the axle for enabling the nut to be tightened up at any time, substantially as herein set forth.

43,441.—Cultivator.—Alfred G. Tucker, Richview, Ill.:

I claim, first, The beams, E E', suspended by means of links, m m', and arms, n n', from rock shafts, O O', in combination with the vertically adjustable reversible plows, G G', and hand-lever, H, constructed and operating in the manner and for the purpose substantially as herein set forth.

Second, The sockets, i i', and set-screws, j j, in combination with the standards, F F', and plows, G G, constructed and operating in the manner and for the purpose substantially as set forth.

Third, The screw-rods, g, and nuts, g', in combination with the separate laterally adjustable section of the frame, A, constructed and operating as and for the purpose specified.

Fourth, The screw-rods, k k', with suitable nuts, in combination with the laterally adjustable plow-beams, E E', constructed and operating as and for the purpose specified.

43,442.—Dish-pan.—John Vandercar, Brooklyn, N. Y.:

I claim a dish-pan, A, with a flanged rim, B, and circular perforated projection, C, or its equivalent, constructed and operating in the manner and for the purpose substantially as herein shown and described.

43,443.—Manufacture of Steel.—Joseph Weisman, Philadelphia, Pa.:

I claim the process herein described of making steel, which process consists in heating bars of iron in closed tubes or boxes with graphite carbon of high specific gravity, substantially as set forth.

43,444.—Composition for Coating Metal.—Joseph Weisman, Philadelphia, Pa.:

I claim the new manufacture or composition of matter prepared substantially as herein-before set forth.

43,445.—Machine for Mixing and Kneading Dough.—William Wells, Middleton, Mass.:

I claim carrying round the blade or spatula, H, by any mechanical means, within a suitable vessel, G, so as to rotate, squeeze and cut the materials to be mixed or kneaded, substantially as and for the purpose described,

43,446.—Switch-stand and Signal-target.—D. J. Whitmore, Milwaukie, Wis.:

I claim the combination of the cog-wheels, e and f, with their respective shafts, d and g, the same being vertically parallel to each other, so constructed and arranged in connection with the rod, e, as to operate the switch and signal-light or target, as herein described and set forth.

43,447.—Car-coupling.—James Widney, Alleghany City, Pa.:

I claim the combination and arrangement of the projections, g and h, trigger, B, and pin, C, with the ordinary coupling-link, the whole being constructed, combined, arranged and operating substantially as herein described and for the purpose set forth.

43,448.—Cradle.—F. R. Wolfinger, Vermont, Ill.:

I claim the combination of the wheel, l, and cord, m, with the parts, n n, spring, D, shafts, d i, gearing, E f g h, crank-wheel, j, and pitman, k, all constructed, arranged and operating as and for the purposes specified.

[This invention consists in combining a cradle, arranged on rockers, with a spring and gearing similar to clock work, a crank wheel and pulley on a rock shaft, all so arranged in connection with a chain or cord, that the cradle may be rocked under the action or power of the spring.]

43,449.—Aerostat.—Solomon Andrews, assignor to Solomon Andrews, jr., Perth Amboy, N. J.:

I claim, first, The conversion of the perpendicular motion of a balloon or aerostat into a forward or horizontal motion by means of the construction or the form thereof, so as to make it ascend and descend on inclined planes in the atmosphere.

Second, The arrangement beneath a balloon of an elliptical or oblong form, to give it a semi-horizontal motion or a forward movement.

Third, Constructing a balloon in the form of a cylindroid, as described.

Fourth, The combination of two or more cylindroids so as to produce a concavity between them for resisting surface.

Fifth, The changing of the inclination of the aereon or aerostat by changing its center of gravity and the changing of the inclination of the disk or oblong sail, substantially as shown and described.

Sixth, The arrangement of an angulometer in the aerial car substantially as described.

43,450.—Embossed Cover for Books.—Wm. T. Anderson, assignor to himself and Hezekiah S. Archer, Brooklyn, N. Y.:

I claim a book-cover, made by striking up a foundation of junk-board, or other material, to form the foundation of the cover, and filling in the raised portions on the inner side by blocks of any suitable material, substantially as and for the purpose set forth.

I also claim combining therewith the inner board, C, substantially as and for the purpose set forth.

43,451.—Hoisting Apparatus.—J. T. Bodley, Jabez Reynolds, and Samuel Van-Emon, assignees of J. T. Bodley and P. P. Lane, Cincinnati, Ohio:

I claim, first, The worm-wheels, G G, on the shafts, in connection with the screws, H, on the shaft, J, when the latter is hung in the bearings, a' a'' a''', to admit of the platform being properly supported in the event of the giving way of any one of the screws or worm-wheels.

Second, The shaft, J, underneath the platform, C, suspended from one end by a journal box, or bearing, a''', and at the opposite end by the belt, L, in combination with a brake composed of the pulley, K, and a concave, p, the latter being either fixed or attached to lever, F', as and for the purpose specified.

Third, The brake composed of the brake-bars, E' E', toggle, C', and weight, D', arranged with the mechamsm, substantially as shown, so as to be operated through the medium of the rod, V, for the purpose specified.

Fourth, The weighted arm, h, on the rock-shaft, T, in connection with the sliding pulleys, P P', and fixed pulley, O, arranged to operate as and for the purpose set forth.

Fifth, The spring, H, attached to the bottom of the building or structure, and in relation with the platform, C, and pulley, K, to operate in the manner and for the purpose specified.

Sixth, The shaft, G', with the projection, u, attached, connected with the lever, F', as shown, or in any equivalent way, or disconnected from it, and having either a fixed amount or having an adjustable amount of end-play, for the purpose set forth.

[This invention relates to certain improvements in that class of hoisting-machines which are designed for elevating goods to the different floors in a building, or from the hold to the deck of a vessel, and for other similar or analogous purposes.]

43,452.—Flax and Hemp Brake.—John L. Boorum and Clebron D. Palmiter, Homer, N. Y.:

I claim a hemp or flax-treating machine, in which the stock is subjected, at one and the same time, to the breaking and scraping action of a series of rollers which revolve about a common axis in one direction and rotate in an opposite direction about their own axis, when said rollers thus operate in conjunction with a bed of rollers, or rolling bed, substantially as described.

Second, Adapting a series of fluted rollers, D, to break and clean flax and hemp, and also to operate in conjunction with a concave bed of fluted rollers, G, without touching the latter, substantially as described.

Third, Giving the several motions to the heads, C C, rollers, D D, and concave bed of rollers, G, through a single shaft, B, substantially as described.

Fourth, Providing for an elastic or shaking motion of the rollers of the concave, in combination with a series of rollers which revolve about a common axis, substantially as described.

Fifth, Giving a reverse rotary motion to the concave bed of rollers, G, to that given to the rollers, D, about their common axis, B, substantially as described.

43,453.—Wagon Brake.—Thomas Christian (assignor to himself and Z. De Bow), Washington, D. C.:

I claim the combination of the levers, G H, rack, G, gravitating arm, h, and gravitating paid, C, all arranged and operating in connection with a wagon brake, in the manner and for the purposes herein specified.

[This improvement consists essentially in arranging the parts in such manner that they operate chiefly by gravitation; and thus is obviated the necessity of employing springs and similar appliances.]

43,454.—Stem of Tobacco Pipes.—Frederick Fickey, Jr. (assignor to Wm. H. Fickey), Baltimore, Md.:

I claim, first, Constructing a tobacco-pipe stem with three tubes, arranged in the manner and for the purpose specified.

Second, In combination with the above, the introduction of a sponge chamber in the course of the tube of the pipe stem, in the manner and for the purpose described.

Third, In combination with the pipe stem constructed as described, the removable cup, h, arranged substantially as and for the purpose specified.

43,455.—Wardrobe Bedstead.—Thomas L. Fortune, Weston, Mo., assignor to himself and George T. Chaliss, Atchison, Kansas:

I claim the combination of the wardrobe and bedstead when so constructed that it may be used as a wardrobe when in a vertical position, and as a bedstead when in a horizontal position, with the hinged posts all arranged and operating substantially as specified.

43,456.—Supplemental Table for Book-binders.—George P. Goff, Washington, D. C., assignor to W. O. Hickok, Harrisburg, Pa.:

I claim the revolving support or turn-table, B, in combination with the parts, e f g and h, or their equivalents, so arranged as to permit the revolution of the table, B, in one direction, and prevent it turning in the other, in the manner and for the purposes described.

43,457.—Lock.—Neil Macneale (assignor to himself and Wm. B. Dodd), Cincinnati, Ohio:

I claim, first, The provision of the "traveling bit," I, which is brought in connection either with the locking or with the detaining parts so as to throw the bolt or adjust the gated wheels by means of the spiral spindle, H, journaled in a slotted hub, G, confined permanently with the door, substantially as set forth.

Second, The arrangement of obliquely slotted main bolt, C F, shifting stud plate, U V u v', gated wheels, T T' T'', and shiftable pin, W, substantially as set forth.

Third, The vibrating anti-picking detent, O, having the double inclined hook, o, and projection, 10, for the automatic engagement and disengagement of said detent with a stationary part of the lock, or lock-case, in the manner set forth.

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Fourth, The provision in a series of change wheels, Q Q′ Q″ Q‴ of the shifting tongues, S, each of which occupies a notch, s, in its appropriate wheel, so much wider than the tongue as to compensate for the thickness of each respective impelling stud, q, on the wheel below, as and for the object explained.

43,458.—Machine for cutting and punching Labels or Tags.—Charles S. Mosely, Boston, Mass., assignor to E. W. Dennison, Newton, Mass.:

I claim, first, Operatiug the punch, H, by means of the connection thereof with the knife, B, in any manner substantially as set forth.

Second, I claim the cutter, K, constructed, arranged and operating substantially as described and employed to cut or clip the corners of the labels or tags, in the manner explained.

Third, I claim the combination of the knife, B, punch, H, and cutter, K, the whole being constructed and arranged as herein set forth, and operating substantially as and for the purpose specified.

[The object of this invention is to produce a machine in the use of which the movement of the operator's hand required to sever the label or tag from the sheet will suffice to operate a punch and prepare the label or tag for the reception of an eyelet.]

43,459.—Straw-cutter.—D'Arcy Porter (assignor to himself and K. Smith), Cleveland, Ohio:

I claim the arrangement and combination of the springs, D E, bottom-board, C, knives, F and F′, and feed-roller, H, for the purposes herein set forth.

And also in combination with the above-named parts, I claim the adjustable plate, J, for the purposes described.

43,460.—Fishing-line Reel.—Wm. H. Van Gieson, New York City, assignor to Thomas H. Bates, Highland, N. Y., and Wm. Mills, New York City:

I claim the combination of the thumb-screw, B, the coiled spring, D, and the friction wheels, E and G, with the cog-wheel, H, and the crank-shaft, F, substantially as and for the purpose set forth.

43,461.—Machine for manufacturing Cords. Ropes, &c.—Jean Antoine de Maniquet, Paris, France. Patented in England March 25, 1863:

I claim the making of cords, ropes, and cables in the manner and by machinery constructed and operating substantially as herein described, whereby the whole strain upon the said cords, ropes or cables is proportionately spread over each strand composing them, notwithstanding its varying thickness and torsion.

43,462.—Amalgamating Barrel.—James Brodie, San Francisco, Cal.:

I claim the introduction of blocks of wood as a lining into the barrel, the ends or grain of which blocks are presented to the action of the ores being amalgamated therein.

43,463.—Preserve and other Cans.—Julien Roussel, Laurent Delangre and Lucian Robin, Nantes, France:

We claim the above-described process for the production of indellible lettering, designs and colored surfaces upon sheet tin or tinned sheet iron, by a combination of lithographic or plate printing and the action of heat upon the surface of tin and upon the metallic colors printed on such surface of tin.

43,464.—Spring and Barrel for Time-keepers.—Adrien Phillippe, Geneva, Switzerland:

I claim constructing the springs and barrels of watches and other time-keepers, substantially as hereinbefore described, whereby the mechanism known as the "fixed" stop may be dispensed with.

43,465.—Submarine Telescope.—Sarah P. Mather, New York City:

I claim, first, The combination of the opening, d, and the door, g, with the submarine lantern and lamp when so arranged and operating that the pressure of the water in which the lantern is immersed shall pack the joint between the door and opening, and render it water-tight, substantially as described.

Second, The combination of a double reflector with the telescope, when arranged and operating substantially in the manner and for the purposes described.

Third, The combination of the lamp with the reflector when the lantern and telescope are so united as to be used as a single instrument, and when all the objects illuminated by one side of the lamp are truly reflected by the mirrors at one observation, and to a signal station, as set forth.

## RE-ISSUES.

1,715.—Base-pin and Lever of Revolving Fire-arms.—Wm. H. Elliott, Plattsburgh, N. Y. Patented Dec. 17, 1861:

I claim so combining the base-pin and lever of a revolving pistol, when arranged centrally below the barrel, as that the base pin may be drawn in a forward direction to release the cylinder without displacing the lever, substantially as described.

I also claim providing a groove, u, in the lever, d, so as to afford a space for the reception of the base-pin, e, as it is passed forward out of the cylinder, as and for the purpose herein specified.

I also claim cutting away the projecting portions of the head of the base-pin as represented at v v, when the base-pin so formed is employed with a grooved lever, d, as and for the purpose set forth.

1,716.—Folding Arm-chair.—James G. English & Edwin F. Merrick (assignees of H. S. Golightly & C. S. Twitchell), New Haven, Conn. Patented Oct. 6, 1863:

We claim, first, Locating the pivot joints of the standards and rear legs in such relation to the pivot joints of the arms that on folding the chair the said joints shall be situated according to the angles of a triangle in any position intermediate between being open and being folded, substantially as set forth.

Second, So connecting the parts of a folding arm-chair by pivot joints that the complete folding may be effected by simply drawing the legs together substantially as set forth.

Third, The construction and arrangement of an arm-chair capable of being folded upon joints without any of the parts thereof having of necessity a sliding motion in or upon the joints substantially as set forth.

1717.—Stave Machine.—Thomas Hanvey, Elma, N. Y.: Patented Aug. 25, 1863.

I claim in a machine for cutting or slicing staves from a bolt or block of wood, the forming and compression rollers so constructed and combined that the cut stave may be passed through sidewise and formed and compressed substantially as herein described.

1718.—Machine for sowing Fertilizers.—John F. Keller, Greencastle, Pa. Patented Jan. 8, 1861:

I claim, first, the arrangement of a series of spike rollers, B, when placed vertically and moved through a partial revolution by reciprocating motion substantially as set forth.

Second, I claim preventing fertilizers from clogging in the hopper (while being sowed), by the use of a roller or rollers moved through a partial revolution and working backward and forward, thus producing a jarring action by reversing the stroke substantially as specified.

I claim the use of the clearers, H, and feed slide, R, (Fig. 5 and 6), the latter having the peculiar openings, G, with sharp edges for cutting the fertilizer away substantially in the manner and for the purposes described.

Fourth, I also claim the arrangement of the movable connecting rods, E and W, in combination with the elbow, X, and the universal joint substantially as described for the purposes specified.

1719.—Reaping Machine.—C. W. and W. W. Marsh, Clinton, Ill. Patented Aug. 17, 1858:

First, We claim the binder tables, M M, when used in connection with the through or grain receiver, I, substantially as and for the purpose specified.

Second, We claim the binder's platform, J, when used in connection with the binder's tables, M M, as and for the purpose set forth.

Third, We claim the tables, M M, and platform, J, substantially as and for the purpose set forth.

1720.—Breech-loading Fire-arm.—Sharps' Rifle Company, Hartford, Conn., assignees of Christian Sharps, Philadelphia, Pa. Patented Sept. 12, 1848, and extended Aug. 25, 1862:

I claim the combination of a gun-barrel open at the breech and a slide movable across said breech to close it with a receiver for the slide and the stock constructed in such manner that the cartridge may be inserted into the bore of the barrel by moving the cartridge forward past the stock and receiver in line or thereabouts with said bore substantially as set forth.

I also claim the combination of a gun-barrel open at the breech, a slide movable across said breech to close it, a receiver for said slide, and a controlling lever, the whole operating in such manner that when the breech is secured the application of pressure to the slide does not tend practically to displace the controlling lever from its position, substantially as set forth.

I also claim the combination of the slide movable across the breech of the gun-barrel to close it, and a lever to control the same, with a spring operating to hold said lever in its position when the breech of the barrel is secured by the slide, substantially as set forth.

I also claim the combination of the slide movable across the breech of a gun-barrel to close it and a lever to control the same, with a spring operating to hold said lever in its position when the breech of the barrel has been opened, substantially as set forth.

I also claim the combination of a gun-barrel open at the breech and a receiver for the slide, with a slide which is both movable across said breech and is furnished with a knife-edge to shear off the projecting butt of the cartridge, substantially as set forth.

1721.—Composition for Water-proofing and coating Fabrics.—The Simpson Water-proof Manufacturing Company, New York City, assignees of Edwin L. Simpson, by mesne assignments, Monroe, Conn.:

I claim, first, The liquid produced by dissolving gutta-percha by means of naptha or carbon spirits substantially in the manner described.

Second, the compound produced by combining camphene, benzine and boiled vegetable oil or their equivalents with liquid gutta-percha in the manner and for the purpose herein set forth.

Third, The varnish or finishing coat produced in the manner described.

1722.—Harvester.—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y., assignee of A. J. Cook, Onon, Ohio. Patented March 28, 1854:

I claim the device for discharging the grain from the receiver, z, in combination with the arm, v, and apron, i, substantially as described.

I also claim the rake, r, revolving with and making one of the wings of the reel, in combination with the cam surfaces, so arranged, and mounted on the reel supports, as to guide the rake in its removal of the grain from the platform, in a path parallel thereto, substantially as described.

1723.—Harvester.—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y., assignee of A. J. Cook, Onon, Ohio. Patented March 28, 1854:

I claim the combination of shear plates, or linings, with slotted guard fingers, that support the crop to be cut both above and below the plane of the cutter, substantially as described.

## EXTENSIONS.

Straw-cutter.—Reuben Daniels, Woodstock, Vt.:

I claim the method of feeding straw, fodder, and other substances, to a series of rotating cutters by means of a continuous motion by a roller with pointed teeth and hung in a swinging frame, substantially as described.

I also claim the method of cutting straw, fodder, and other like substances, by means of a cutting cylinder, provided with cutters, the outer faces of which, from the cutting-edge, are curved or inclined in towards the axis, so as to admit of continuous feed, the blades of the cutters acting as gage plates for the length of the cut, in combination with the feeding the straw, fodder, or other substances to be cut, by continuous motion substantially as set forth.

Knitting Machine.—Joseph Hollen, White Township, Pa.:

I claim, first, The projecting and withdrawing the needles separately and singly, with their arrangement as described, by which I am enabled to knit closer work with stouter needles, substantially as described;

And Secondly, In combination therewith, I claim the combination of the jack, the sinkers and depressers, substantially as described.

Thirdly, I claim the thread-bearer, V, having an extended sideway motion to and fro, at each stitch, by which it lays the thread across the needle at each stitch, and returns with it to be ready for the next stitch.

Fourthly, I claim the spring vice for regulating the supply of thread, to the needle opened by the rod, w, substantially as described.

Fifthly, I claim the peculiar arrangement and combination of the several parts of the machine, by which their various motions are derived from a single crank and screw thread substantially as described.

Boot-tree.—Wm. Upfield, Lancaster, Ohio:

I claim the combination of the sliding wedges, A A, and the right and left screws, B B, with the inclined planes or grooves, c c, substantially in the manner and for the purpose above set forth, the screws, B B, being made to play within the groove, D, and being confined to its place longitudinally by the bar, E, working in the groove, H.

Machinery for double-folding Wide Cloth.—Zachariah Allen, Providence, R. I.:

I claim the use and application of the rigid prong or extension piece, A, to act upon the middle of the piece of cloth in the process of it, in connection with the winding rollers, C D, to secure the exact double-folding of the cloth.

Seeding Machine.—Lewis Moore, Bart, Pa. Re-issued Oct. 12, 1852:

I claim the employment of a reciprocating gage plate when provided with feeding apertures in combination with corresponding apertures in the upper bottom which have their sides oblique, to the sides of the apertures in the said reciprocating plate and when combined with a device for giving it a variable reciprocating motion for the purpose of sowing the seed constantly and uniformly and varying the amount at pleasure, while the machine is moving by simply varying the extent of its reciprocating motion as herein described.

I also claim the pivoted rod, m, and vibrating lever, p, which is provided with apertures arranged in the arc of a circle whose center is at the pivoted end of the rod, m, in combination with the curved or undulating disk, s, and the gage plate, j, substantially as herein described for the purpose of imparting to the gage plate a reciprocating motion which may be varied at pleasure by the operator by inserting the rod, m, in one or another of the apertures in the lever, p, at different distances from its fulcrum.

Steam Boiler.—F. P. Dimpfel, Philadelphia, Pa.:

I claim, first, So arranging a series of bent water tubes within the flue space of a boiler, and connected at each end with the body of water in the boiler, substantially as herein described, by means of which the circulation of water is greatly increased, and the injurious effects due to expansion and construction avoided, substantially as described.

Second, I also claim surrounding the crown sheet to which the ends of circulating tubes or their equivalents are attached, with a rim, substantially as and for the purpose specified.

Third, I also claim extending the ends of the tubes, or equivalents thereof, above the crown plate or roof of the fire-box, or any other plate or plates, one side of which is fire surface, to which they are attached (when the other or lower end communicates with a water space or spaces below or beyond the plate to which the upper ends are attached), substantially as and for the purpose specified.

Fourth, I claim giving a forced circulation to the water through the boiler or generator by mechanical means, substantially as and for the purpose specified.

Manufacturing Ice.—Alexander C. Twining, Hudson, Ohio. Patented in England, July 3, 1850:

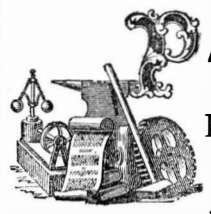
First, I claim the combination of an exhausting pump or apparatus that is also condensing or compressing with a restorer and with a freezing cistern, having water chambers, substantially as above.

Second, I claim the same pump and restorer in combination with a separate exhaust vessel (the same whose connection is indicated in the drawing by p,) in or around which the ether or other liquid uncongealable at the temperature employed is cooled and made to pass into the freezing cistern and there perform its office substantially as above.

Third, I claim the operator or apparatus introducing into the cistern or the separate exhaust vessel the ether or volatile liquid, in jets or drops, as above, in combination with the exhaust pump and restorer.

Fourth, I claim the use of the water vessels in combination with the water chambers, and the intervening liquid for perfecting contact as above set forth.

Fifth, I claim in combination with the restoring apparatus, the cooling of the liquid around the same by exhaustion, using therefore the secondary pump and connections, substantially as set forth.

# PATENTS

GRANTED

FOR SEVENTEEN YEARS!

MUNN & COMPANY,

In connection with he publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during the past *seventeen years*. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after *seventeen years'* experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex-Commissioners of Patents:—

MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter:

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant,

J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant,

WM. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F. and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row New York.

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is $15. Other changes in the fees are also made as follows:—

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| On filing each Caveat | $10 |
| On filing each application for a Patent, except for a design | $15 |
| On issuing each original Patent | $20 |
| On appeal to Commissioner of Patents | $20 |
| On application for Re-issue | $30 |
| On application for extension of Patent | $50 |
| On granting the Extension | $50 |
| On filing a Disclaimer | $10 |
| On filing application for Design (three and a half years) | $10 |
| On filing application for Design (seven years) | $15 |
| On filing application for Design (fourteen years) | $30 |


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The Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject, giving a brief history of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

COPIES OF PATENT CLAIMS.

MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention

Patents may be extended and preliminary advice obtained, by consulting or writing to MUNN & CO., No. 37 Park Row, New York.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American atent Agency, No. 37 Park Row, New York.

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It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York.

## TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

MODELS are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgement of our reception of their funds.

## Notes and Queries

J. F., of Pa.—An eolian harp is placed in the opening of a window under the sash, and is operated by the current of the wind sweeping over the strings. The strings are upon the outside of the box, and the sound hole is through the top of the box under the strings. The size of the sound hole may be one by two inches. The pressure per square inch on a steam boiler cannot be calculated, but it can be measured by an instrument constructed for the purpose. You will find an illustration of such an instrument on page 16, Vol. IX., SCIENTIFIC AMERICAN.

W. M. R., of Wis.—No doubt Mr. Beswick's statement of the discovery of a planet was erroneous. If you had given the volume and page where your water-wheel was mentioned we would have referred to it. Your statement that superior microscopes are made in a log shop in Michigan is interesting. Nothing can be more gratifying than to see all parts of the country, though wounded and bleeding, pressing forward together in the culture of science and the acquisition of knowledge.

D. D., of Ill.—The explosive action observed when water is thrown into hot fat results from the sudden evaporation of the water. Tallow cannot be boiled without being decomposed, but it requires a temperature of about 600° to effect its decomposition, and when heated near this point if a drop of water is thrown into it the water will be evaporated with explosive suddenness. Even if carbureted hydrogen were generated in your boiler it would be mixed with too much steam to burn.

E. E. S., of N. Y.—A young man could undoubtedly succeed as a civil engineer in this country. The prospects ahead are favorable for men of this profession. You ask for the requisites necessary to secure eminence. Our answer is that a first-class education in mathematics is indispensable, for the rest, the same qualities that command success in other callings are also required. And that is faith in one's self-energy, determination, and industry. With such aids it would be hard to see how a man could fail in his undertakings.

R. P. B., of Wis.—We take a great deal of pains to give information in this column, but we think if you had reflected you would have seen that it was unreasonable to ask us to send you an estimate of the cost of a 200-horse steam engine with drawings for same. Write to some consulting engineer and see what he would charge you for such a service, that you require gratuitously.

J. C., of Mass.—There is no advantage in passing heat through flue boilers as many times as you propose. The object in causing a circulation is to burn the products of combustion—gases—under the heating surface of the boiler, not in the smoke-box or somewhere in the chimney where it is wasted. You can judge yourself by examining the temperature in your smoke-box whether the heat is being wasted or not. We cannot tell what percentage of heat is lost without a personal inspection.

T. B. C., of Conn.—Communications in cipher, by substituting figures for letters, are not new. A letter or message sent in this way is easily read by an expert.

S. S., of Mass.—We do not know of the existence of any State law that prohibits the running of steam carriages upon common roads. Such carriages have frequently been tried, but were abandoned on economical grounds.

E. G., of Ohio.—We have carefully examined the sketch and description of your alleged improvements in machinery for cutting corks, and it appears to us not to contain anything new or patentable. The invention of John Conroy, of Boston, contains substantially the same devices that you claim. If you desire it, we can make a careful preliminary examination into its novelty at the Patent Office. This examination would determine the point.

T. W. & S., of England.—The patent of Mr. Root for punching and forming the eyes of axes was granted in 1833, and so far as we know, with slight modifications, has been in use ever since.

T. W. B., of Ohio.—Your letter and diagram respecting the strength of steam boilers came safely to hand some time ago, but we have been unable to find room for it. We think your position unsound and refer you to Fairbairn's treatise on this subject, which is now being published in the SCIENTIFIC AMERICAN.

J. McK., of N. Y.—A good alloy for strong brass (or composition) boxes to carry heavy shafts is made in the following proportions:—Tin, 2½ ounces; zinc, ½ of one ounce to 1 pound of copper. Common yellow brass is made harder by the addition of ¼ of an ounce to the pound, lead in the same proportion makes it more ductile, so that it casts sharper in the mold.

J. W. P., of Maine.—It is possible to cut off by the link motion, but good engineers prefer to use a separate cut-off, in connection where it is desired to work steam expansively. The main slide is made without any lap, and the cut-off is produced by another valve working on its back.

J. D. R., of Ill.—Connected with Yale College, New Haven, Conn., there is a "scientific course" where young men may devote themselves specially to the study of mechanics, engineering, chemistry, philosophy, drawing, etc. There is at present no very great demand for instruments for drawing ellipses; but a patent for a good improvement ought to bring much more than the cost Constructing heavy guns by winding hot wire upon a mandrel, and welding by hammering, is not new. Your special machinery or devices for doing the work may, however, be patentable. A common mode of constructing the journals of oscillating engines is to make them hollow and operative as valves, as you propose. Bourne's catechism of the steam engine is a good treatise, to be had at the prominent book stores.

A. B., of Mass.—Sulphuric acid is used to dissolve indigo for dyeing, and the stronger it is the more it will dissolve. The blue stone or blueing used in starching linen is made by mixing starch with sufficient pulverized indigo to produce the desired color

G. E. H., of Mass.—We published your acceptable letter on the effect of iron on peach trees. The friction of an engine is variously estimated, Bourne gives it as 1.5 pounds deducted from the pressure on the steam gage, while others reckon it as high as 3.5 pounds. The friction of details is not reckoned, neither is the area of the piston-rod section counted. By an inadvertance we reckoned only one stroke of the piston in giving the rule for finding the horse-power in the number you mention. But the text above this error gave the rule correctly, so that the omission was readily noticed and attributed to the right cause by inquirers. It is an empirical rule at the best, and the only way to ascertain the exact power exerted by the steam engine is with a dynamometer, or force measurer. The indicator shows the mechanical action of the steam in the cylinder during its ingress and egress. The rule for ascertaining the nominal horse-power of an engine is simply to multiply the square inches of area in the piston by the steam pressure less the amount deducted for friction and back pressure, say three pounds. The sum thus obtained must be multiplied by the speed of the piston in feet per minute. This is obtained by multiplying the number of single strokes by the length of one stroke; dividing by 33,000 will give the nominal horse-power of any engine. King's notes on the steam engine is a good work for your purpose. Address H. C. Baird, 406 Walnut street, Philadelphia.

G. H. H., of Mass —A composition for modeling is made of rosin, glue, and whiting, but after a long search we are unable to find the formula, or proportions. A little experimenting will soon set you right. Modeling clay kneaded with glycerine remains permanently soft and preserves its sharp outlines.

A. J. C., of Ohio.—Take the softest side of a razor-strap, put rouge powder or crocus on it, and rub your cutlery rapidly with it. This will remove ordinary stains, but if they are rusted-in you will do better to send the goods to a cutler to be refinished.

E. B., of Mo.—At an expense of $3 you could have duplicates made of any of the drawings in the Patent Reports, except those that are complicated.

J. R. G., of Mass.—We are pleased to know that you intend to investigate the process of making corn-husk paper, etc. The husks are simply boiled under pressure in a solution of lime and soda, proportions determined by the quality of the husk. The fibrous element is set free and the lighter portions from which the paper is made floats. This is afterwards treated as other paper stock is.

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At the Scientific American Office, on account of Patent Office business, from Wednesday, June 29, 1864, to Wednesday, July 6, 1864:—

J. B. E., of Mo., $217; R. & N., of N. Y., $60; E. D. W., of N. Y., $20; R. & Y., of N. Y., $20; W. W., of N. J., $20; J. N. B., of N. Y., $45; A. J., of Md., $29; B. T. R., of Conn., $41; C. H. R., of R. I., $41; B. S., of Miss., $20; L. P. & N., of Pa., $20; J. M., of N. Y., $56; F. B., of Ind., $63; T. K. A., of Ill., $20; J. Y., of Minn., $45; C. B. & Co., of N. Y., $44; W. H. A., of N. Y., $20; C. M. M., of N. J., $20; D. & Co., of N. Y., $20; H. W. C., of Vt., $40; J. A. C., of Maine, $45; A. S., of N. Y., $16; A. H. W., of N. Y., $45; N. B., of Ill., $45; A. M., of N. J., $20; E. H., of N. Y., $20; T. S., of N. H., $56; W. J. L., of Mass., $25; H. F., of Ill., $15; J. C. T., of Pa., $9; L. DeL., of N. Y $41; J. A., of N. H., $28; A. & B. N., of N. Y., $25; A. L. S., of Conn., $23; J. W. C., of N. Y., $16; J. McD., Western Va., $16; W. N. S., of Ill., $16; J. A. M., of Ky., $20; A. P., of N. J., $16; J. O., of Ill., $15; H. & S., of Pa., $20; J. N. P., of N. Y., $28; W. H., of N. Y., $16; P., of England, $16; J. W. S., of Mass., $25; A. A. K., of Minn., $25; A. S. R., of Iowa, $16; S. B. C., of Ill., $16; C. P., of Ohio, $16; H. C. H., of Ill., $30; S. J. H., of Cal., $20; I. H., of N. H., $25; E. M. C. of R. I., $26; B. L. W., of —— $16; S. F. K., of Mich., $15; J. L. R., of Mo., $31; J. R. F., of Ind., $25; J. B. L., of Iowa, $25; W. & S., of Germany, $75; W. G. H., of Ind., $25; W. D., of Cal., $10; W. G. K., of Ind., $16; G. G. P., of N. Y, $16; W. R. M., of Pa., $32 50; F. G. S., of Mass., $26; R. T., of Wis., $28; S. L., of N. J., $25; C. A. S., of N. Y., $25; P. B., of N. Y., $41; E. D. W., of N. Y., $26; W. M., of N. Y., $25; D. M. A., of N. Y., $25.

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Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, June 29, 1864, to Wednesday, July 6, 1864:—

H. B., of N. Y.; T. S., of N. H.; T. S., of N. J.; McI., & R., of Colorado Territory; S. J. F., of Cal.; A. A. K., of Minn.; J. W. S., of Mass.; H. & S., of Pa.; A. D., of La.; J. A., of N. H.; A. L. S., of Conn.; J. S., of England; I. B., of N. Y.; J. A. M., of Ky.; W. J. L., of Mass.; J. K. A., of Ill.; A. & B. N., of N. Y.; J. N. P, of N. Y.; S. L., of N. J.; J. B. L., of Iowa; J. W. N., of Conn.; J. F., of Ind.; W. G. H., of Ind.; J. L. R., of Mo.; I. H., of N. H.

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Letter from Charles A. Seely, Esq., Professor of Chemistry :—
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HENRY GERNER, C.E., 200 Broadway, New York.—*Dear Sir* :—During my leisure of the past few days, I have been very agreeably employed in the study of your various improvements in furnaces. The first favorable impression which, as you are aware, I conceived of your plans, are more than confirmed; every doubt is now removed. The economy of fuel and the other advantages of your system which you claim, seem to me results which must follow by a rigid necessity. For myself, I need no further demonstration to convince me of the practicability of your various devices; they are founded on well-established laws of combustion and heat. I wish for your great and laudable enterprise every success. I have no doubt that you are able to bring about an economy of fuel in any furnace in the country, and your extensive experience and profound knowledge of the subject qualify you to determine in advance, very accurately, the amount of saving that may be realized in any specific case. I look upon you as the master of the science and art of using fuel economically. With these continual assurances of my high esteem, I remain very respectfully yours,

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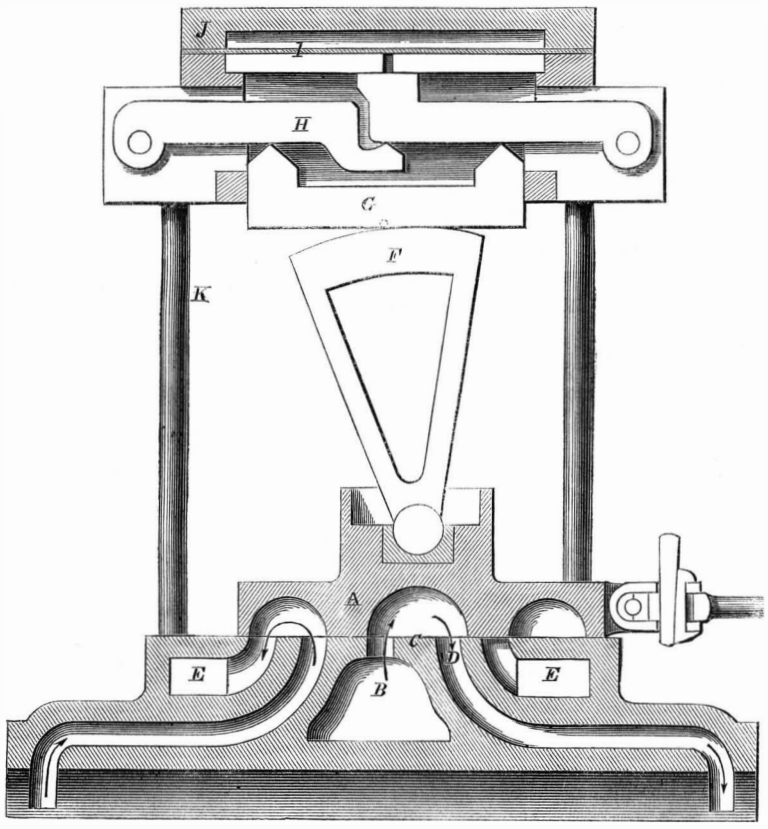
### Improved Balance Valve.

A slide valve working in the open air, without any steam chest of the ordinary kind, is certainly novel to the engineering portion of the world. The engravings published herewith represent such a valve, and by referring to them and this description, the construction of it will be understood. To the engineer no explanation is required, as the simplicity of the valve is plain at a glance.

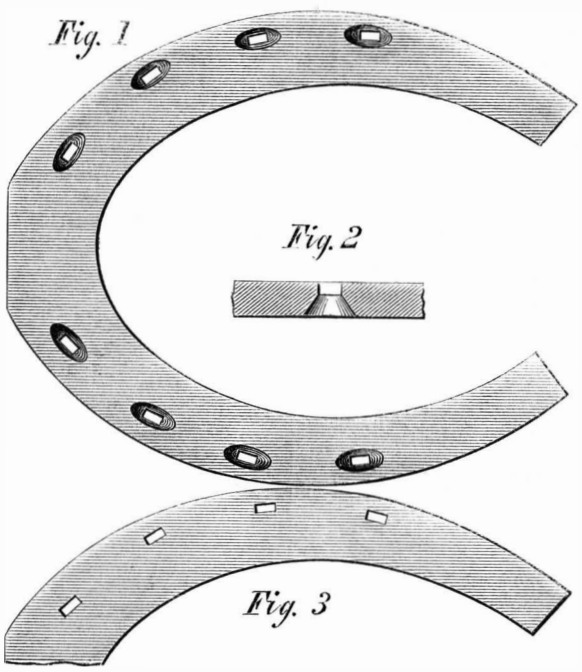



DAVIES'S BALANCED VALVE.

The valve, A, shown in section, receives steam through what is usually the exhaust-port in common steam engines, that is the passage, B. From this opening it passes over the bridge, C, into the steam opening, D, through which it acts on the piston as in all other engines. The exhaust-ports are shown at E, and the passage of the steam through them is indicated by the arrows.

steam is introduced over the diaphragm. The action of this mechanism is obvious. When steam is applied to the diaphragm it forces the valve down, and the ingenious arrangement of the lever causes an equal strain to be put on all parts of the valve-face. This plan of balancing a slide valve has the great merits of simplicity and accessibility. The absence of any steam chest permits the engineer to see at a glance whether the valve is working steam-tight or not, and it is also a preventive against scratching or cutting the valve seat by any foreign substances which may fall on the surface. The valve may be examined at any time, and if deranged the reason of it and resetting it is much easier accomplished than where many bolts have to be taken out of a steam chest and joints broken, as in all other engines. When desired, a light circular case is fitted to these valves for the purpose of excluding dust, etc.; but this is in no sense a steam chest, for steam never enters it.

This plan of balancing slide valves can also be put upon any engine now in use, old or new, and will effect a very great saving in the power required to work this detail. The plan for balancing this valve was patented on March 15th, 1864, through the Scientific American Patent Agency, by Henry Davies; for further information address him at Portsmouth, Ohio.




CUSTER'S HORSE-SHOE.

In order to balance this valve, and prevent it from being blown off its seat by the unusual plan of introducing steam, there is a sector, F, provided, which is fitted to a knuckle joint at the back of the valve. The other extremity bears against the plate, G. This latter plate bears (through the medium of the arms, H) against a flexible diaphragm, I, in the chamber, J. This chamber is supported by the rods, K, and

### Improved Horse-shoe.

Horse-shoes, as generally constructed, have a crease on the underside in which the nail-holes are punched. This weakens the shoe so much that in a short time the thin outside edge breaks off and virtually destroys it.

The plan adopted by the inventor of the shoe illustrated herewith is to countersink the nail-holes instead of grooving the bottom surface. It is claimed that this produces a much stronger and more serviceable article than those generally made, and that it will prove a desirable improvement in the manufacture of this necessary article.

The several figures, 1, 2 and 3, show the shoe in all its aspects, and it is intended to punch the holes and countersink them with one tool, so that the cost of manufacture will be much reduced. A patent for this method of constructing horse-shoes was obtained on June 28th, 1864, by George Custer, through the Scientific American Patent Agency. For further information address the inventor, at Monroe, Mich.

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